MOTOR AGE

June 19, 1913

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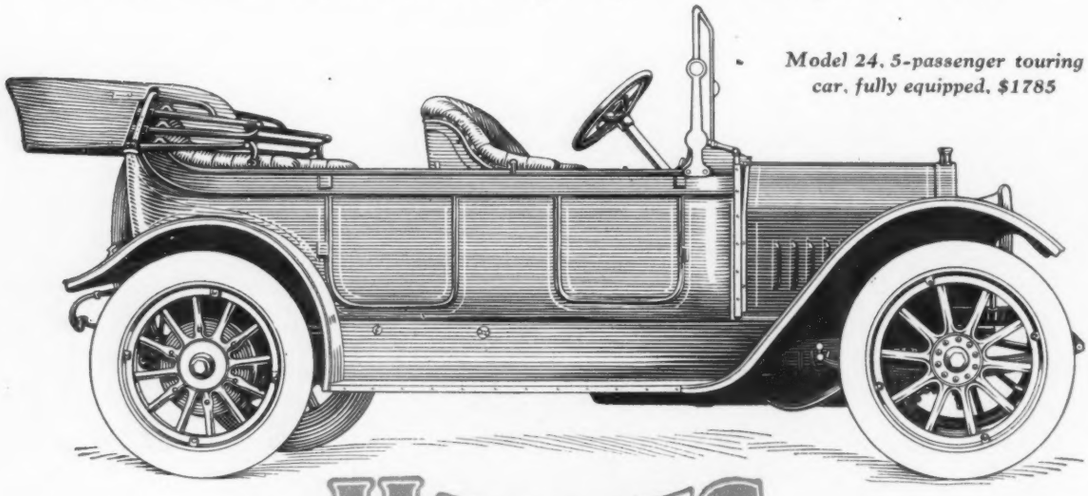

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The illustration at the bottom of this page shows an Eisemann Armature used in one of the magnetos with automatic spark control.

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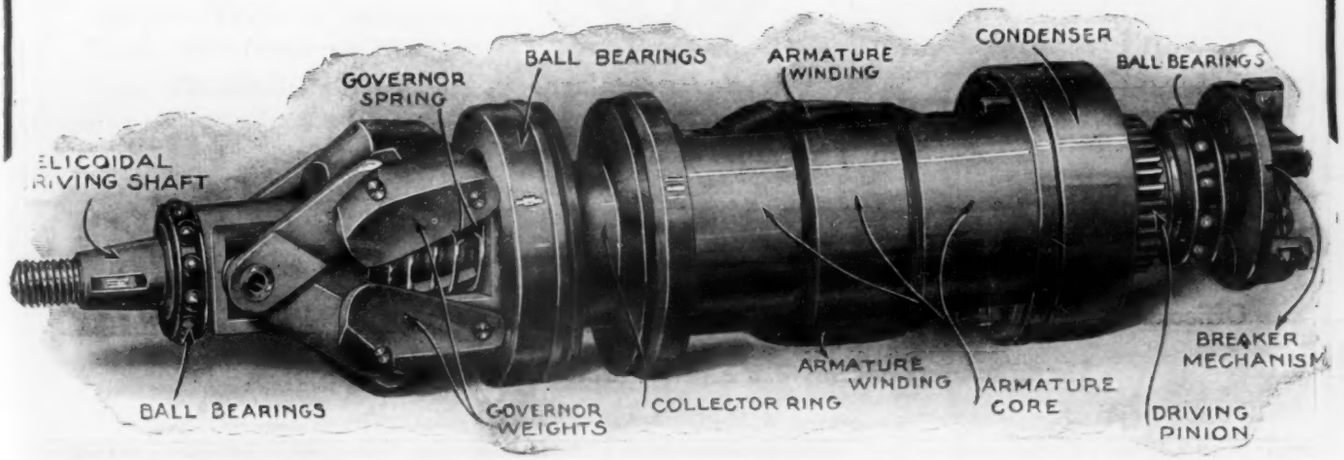

MOTOR AGE

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Contents

DEPARTMENTS

VOL. XXIII, No. 25 CHICAGO, JUNE 19, 1913 $3.00 PER YEAR

MOTOR AGE

Storming Old Storm King

THE illustration shows the view from Cro' Nest looking north, also the southern slope of Storm King. The white line indicates the approximate location of the highway around the mountain and across the canyon which separates it from Cro' Nest. -When the highway reaches the south side of the mountain it will be carried down the Storm King slope by a viaduct, one end of which will rest in cliffs 200 feet above the river and the other point on forest floor of the slope some distance back from the shore.

This is a wild strip of ravine which will bebridged. The road will cross the cove in a curve so as to maintain its original level and before mounting the rocks to Cro's Nest will cross another deeper mountain brook. After being carried across a low shoulder of the mountain the road will start the ascent of Cro' Nest. Hanging bridges, retaining walls and other devices will have to be used by the engineers through this strip of the roughest country in the world.

Also indicated in the sketch is the much-talked-of tunnel. At this point the rock rises perpendicular to a height of several hundred feet without a ledge wide enough to afford footing for a mountain goat. This section of the road is the most difficult with which the engineers will have to contend.

By George C. Donahue

RISING 1,340 feet above the blue Hudson stands a mute monster of granite, a barrier to the motorist who seeks to pierce the land of romance beyond and tour the regions of New York famous for their scenic grandeur. It is old Storm King, pioneer of the glacial epoch, mighty and foreboding.

Old Storm King has blocked the progress of the traveler for centuries, but his days of supremacy are numbered. New York is planning to lay siege to the rugged mountain and conquer it. Engineers are now at work devising means whereby Storm King can be transformed from a barrier to a road bed easily accessible to motor cars. There also is talk of operating on the mute monster, to build a tunnel through the rock and thus force it to surrender, but this project does not meet with the favor that the roadway scheme does.

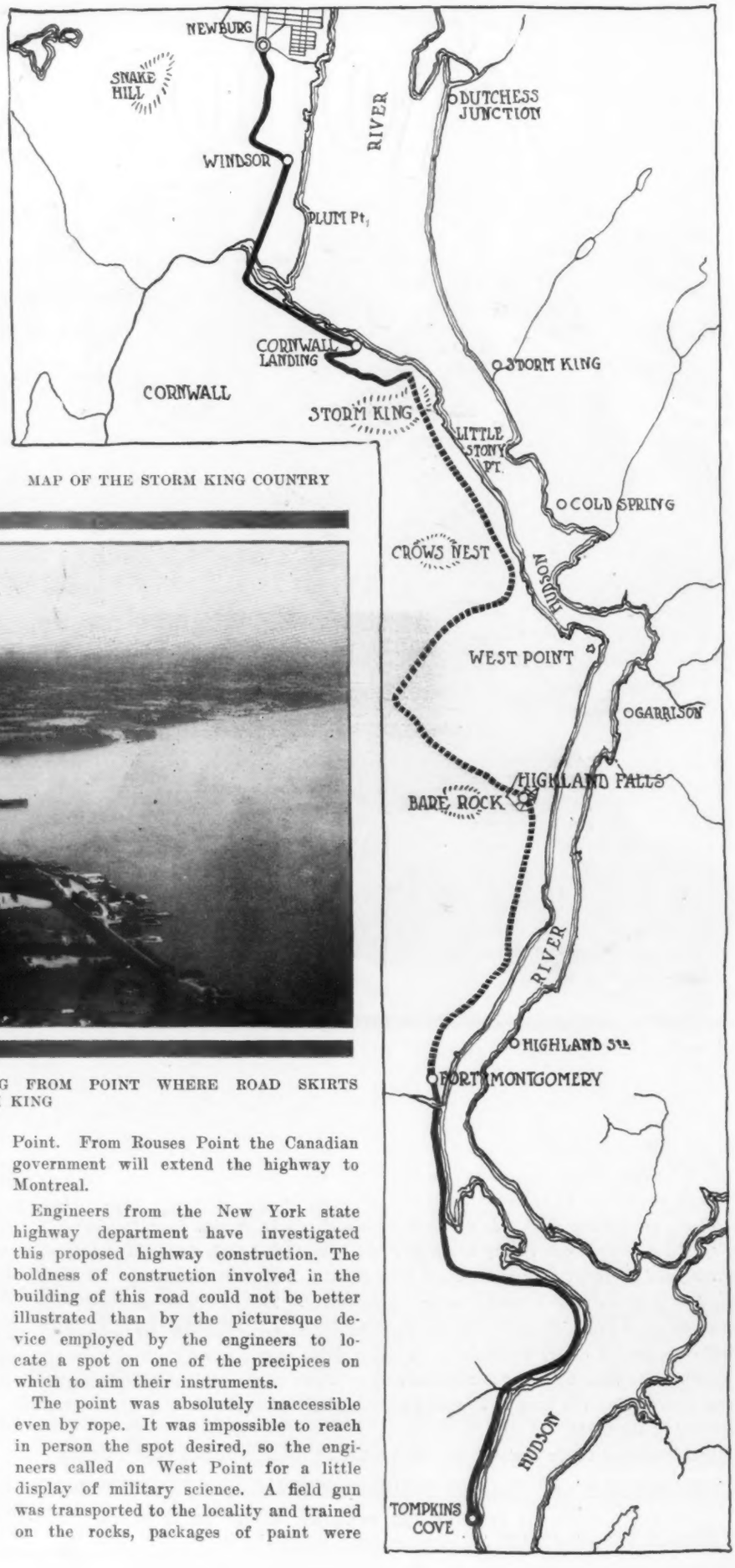
Doubtless the most picturesque motor tour in the eastern part of America today is the New York state route extending from the Jersey line north along the west shore of the Hudson river to Albany, thence through Saratoga Springs and Lake George and through the Adirondack regions skirting the banks of the magnificient Lake George and the awe-inspiring Champlain to the Canadian line. Running as it does through mountainous country practically the entire distance to Albany, with the Hudson river immediately beneath, the beauty of the constantly changing view is unexcelled.

The trip up the river by boat is famous now the world over but with the capitulation of Storm King how much more magnificient will be the trip by land! One moment the traveler will be above

the clouds over the river on some mountain with the country lying like a fairy map before him, and the next, buried in some cool valley with only the near beauties of wild nature about. And all of this is to be of immediate access to motorists hitherto shut off by land from the most charming section of this country for no other reason than that the roads were unfavorable for travel.

Road a Difficult One

The most difficult stretch of road in the entire route lies just north of West Point between the military camp and the village of Cornwall. The proposed highway will skirt around the government reservation and immediately begin the ascent of the Cro' Nest mountain and then just beyond the Storm King mountain which juts out into the river a great mass of granite. The face of this cliff is made up of great broken boulders shutting off the sunlight. Guards are kept there constantly day and night with signal boxes every few feet for warning in case tracks are swept into the Hudson by falling boulders.



MAP OF THE STORM KING COUNTRY

LOOKING NORTH ON CORNWALL LANDING FROM POINT WHERE ROAD SKIRTS STORM KING

It is proposed to construct a state highway around the face of Storm King mountain, a distance of 2 miles, which will lessen the mileage between West Point and Cornwall by 19 miles, the distance one has to travel at the present time. The road will form a part of the great international highway from Miami to Montreal, lying between West Point and Cornwall on the west banks of the Hudson river. When state route No. 3 is completed there will be a magnificent state highway extending from New York to Tarrytown, then across to the Jersey line and northward to Albany and Rouses Point. From Rouses Point the Canadian government will extend the highway to Montreal.

Engineers from the New York state highway department have investigated this proposed highway construction. The boldness of construction involved in the building of this road could not be better illustrated than by the picturesque device employed by the engineers to locate a spot on one of the precipices on which to aim their instruments.

The point was absolutely inaccessible even by rope. It was impossible to reach in person the spot desired, so the engineers called on West Point for a little display of military science. A field gun was transported to the locality and trained on the rocks, packages of paint were

then fired at the cliff and breaking on the rocks provided the engineers with a prospective point from which to begin their observations.

Cost Is Figured

To build the Storm King road will cost in the neighborhood of $200,000, or $100,000 a mile. The view from the road on the north will extend beyond the Poughkeepsie bridge with a good part of Dutchess county towns visible to the east. On the road on the south side of the mountain Haverstraw bay with all country contiguous will be visible, the parade ground at West Point being apparent but a short distance below the traveler. Poughkeepsie will be as readily seen from the south as Newburgh on the north.

Even though the state of New York might decide upon a tunnel highway, it is quite probable that eventually two roads will be constructed over the Storm King route, one by tunnel under the supervision of the state, and the other over the mountain by the New York Palisades park commission which already has signified its intention of securing possession of Storm King and Cro' Nest mountain as part of its large park reservation. Of course, the Palisades park road will be a much longer period of time in materializing and the popularity of the west shore road along the Hudson will have been so firmly established by that time that the necessity for the second or outside highway will be apparent to the state highway commission.

VIEW SHOWING APPROACH TO STORM KING FROM THE NORTH ALONG WEST SHORE OF HUDSON RIVER

Much interest is being shown in this project by the American Scenic and Historical Reservation Society. The society has offered to aid the New York state highway department in every way possible and is in favor of the adoption of a location surveyed at a 400-foot level with no tunnel in preference to the original plan for a 180-foot level with a tunnel and an eventual exchange of the tunnel with the West Shore Railroad for its present tunnel at the base of the mountain.

Two Schemes Offered

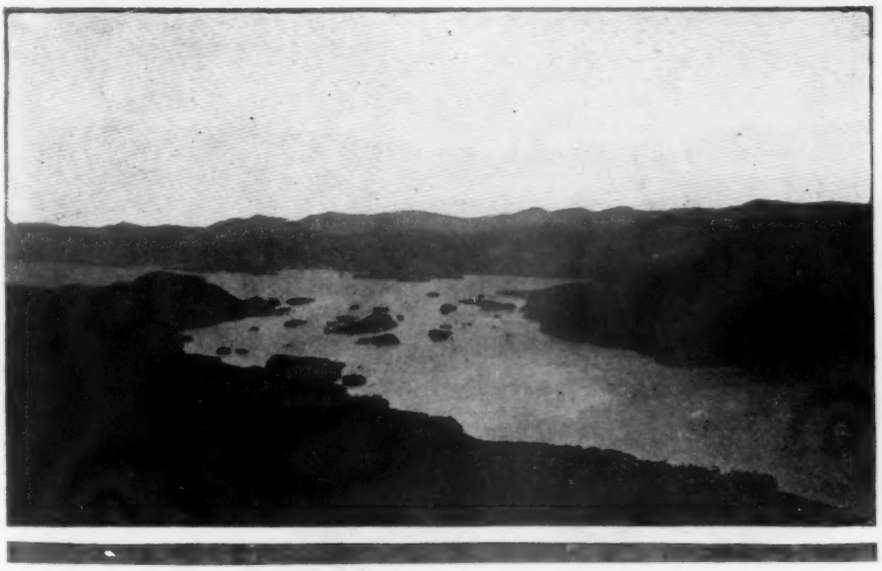
Two propositions are now being considered by the New York state highway department for constructing this highway; the tunnel at 180-foot level about 300 feet back from the face of the mountain or an open road around the face of the mountain 400 foot level. The cost of construction of this open highway would not be considered. There is a unanimity of opinion by state officials that money should not be allowed to stand in the way of the road. It will be a monument that will last forever.

With a view to arriving at a feasible solution of this difficult problem, a joint survey has been made by representatives of New York state highway department, the New York Central lines, and the New York Palisades park commission. Estimates have been made of the three different routes around Storm King and as soon as Governor William Sulzer requests a report it will be made public. The parties to the survey will, no doubt, recommend the 400-foot level, no tunnel highway.

Object of the Road

The paramount object of this road and its justification is to make available to tourists and travelers the magnificent river and mountain scenery of the Highlands which is to be surpassed by nothing this side of the Rocky mountains. It is a great opportunity and it is folly to have that opportunity handicapped and to a great degree nullified by a tunnel 1,800 feet through the mountain as suggested in the first instance.

If the tunnel proposition were carried into effect the chief object in building this expensive piece of highway would be eliminated. From the magnificent scenic view anticipated, the prospect changes to an ugly, subteranean passage always to be artificially lighted and policed, a veritable holdup rendezvous, were an officer ever absent.



LAKE GEORGE, SHOWING VIEW OF THE NARROWS TAKEN FROM BLACK MOUNSTACLES—THE LINE OF THRUST BEINGTHE SHORE OF THE LAKE

STATE HIGHWAY SECTION NORTH OF TOMPKINS' COVE AND POINT OF HIGHWAY COMPLETED TO FORT MONTGOMERY

Instead of a stretch of road rivaling the world-renowned European mountain highways cut from solid rock for hundreds of miles we would have a dark and dismal tunnel of which we all would be ashamed. The chief reasons put forward for the tunnel construction are the engineering problems incident to the open highway around the face of the mountain, the delay which would be necessitated by such a plan, and the possible damage to the West Shore Railroad from blasting, etc., on the precipitous cliffs above the rocks.

Not Difficult Engineering Feat

In comparison with other engineering feats performed in the state of New York the feasibility of constructing the Storm King mountain highway around the face of the mountain can scarcely be considered more difficult than those which are being solved every day all over the world in this age of marvelous engineering transformations. The mere suggestion that a tunnel may have to be resorted to is a reproach to the greatest and richest state in the union.

As to the danger to the West Shore Railroad with the possibility of the sliding of earth at Crows Nest, a small mountain close by, this could be taken care of in a manner to eliminate all danger to the traveling public. With the road built at a sufficient high grade on Storm King, all danger could be averted, though it would take engineering skill and the cost of the work is hard to estimate.

One of the engineers who examined the formation of this mountain stated the rock was so cross-grained that it would be impracticable to blast. He added the gallery construction would be fine but that its cost would be prohibitive even if the rock strata would permit.

From a commercial standpoint the completion of such a road would be a great boom to the towns and cities along the west shore of the Hudson between Newburgh and Albany. That a highway built around the face of the mountain from which tourists might look down to the river 400 feet below and besides give an uninterrupted route along the west shore would be an attraction to thousands and thousands of tourists each year would be assured. Despite this, however, selfishness and greed have combined to shoulder on the state large expenditures for rights of way and thus block the project.

Getting Right of Way

When the proposition was first proposed several years ago, the authorities found that it would be necessary to obtain the right of way over a quarry which suddenly had become productive and worth to its owners at least $200,000 a year. The price was so prohibitive that the plan was abandoned until an injunction was secured by parties interested in the new highway. One thing is true and that is that all classes of citizens on the west side of the Hudson are working together, and any attempt on the part of corporations or individuals to block or defeat the project which is going to mean so much to all concerned will be met with mighty opposition.

The proposed road around the face of old Storm King recalls a wealth of history and legendary lore associated with Henry Hudson and the early Dutch settlers, most of which has been made immortal by the writings of Washington Irving. Geologists tell us that Storm King on the west side and Breakneck on the east side of the river stand as guards at the mouth of a comparatively new channel. Research recalls the fact that a gigantic upheaval once visited this section.

Previous to that there was an immense lake to the northeast, the waters of which covered not only the present geo-

STORM KING MOUNTAIN'S LEDGE OF SOLID ROCK, WHICH WILL FURNISH AN EXCELLENT BASE FOR PROPOSED HIGHWAY

graphical limits of the city of Newburgh, but submerged the mountain known as Snake hill, southeast of the city, and that this water found its way to the sea through the Ramapo valley, about 20 miles to the southwest of the present Hudson river channel. This subteranean upheavel explains the break which forms the channel between Storm King and the mountain opposite. When this fissure opened the lake waters found a new outlet and gave way to the waters of the Hudson.

Historical Points of Interest

It was in the vicinity of Storm King that Major Andre was captured as a spy and hung and here Benedict Arnold plotted to betray the Revolutionary army. The mention of this mountain recalls the early history that centered around Kingston and Newburgh; how the unpaid patriot soldiers wanted Washington to lead them against congress and become dictator and king, and how Washington refused a crown and made future generations of Americans his debtors for our republican form of government. If old Storm King had the power of speech he would be able to tell about many interesting things that have happened since he stood frowning down upon the river that flows along at his feet.

Because of the location of this great mountain Washington decided to establish the United States Military Academy at West Point which lies to the south. He saw the possibilities of Newburgh bay as a harbor for an enemy's fleet from which basis it might harass the surrounding country, and his aim was to keep the hostile ships from getting into that harbor.

ILLUSTRATION SHOWS DIFFICULTY OF ROAD CONSTRUCTION ALONG WEST SHORE OF HUDSON RIVER

Just at the point where the present road sweeps around the majestic shoulder of old Storm King, guarding the once strategic point on the Hudson, the tourist gets his first glimpse of the nursery of military genius, West Point, where three generations of American heroes have learned the arts of war and learned them well. Strange indeed, it seems that these modern disciples of Mars should have taken the initiative in the storming of old Storm King, once considered their formidable ally in the defense of the nation against alien attack.

As you ride over the highway on the heights, you can see the gray barracks where General U. S. Grant once shined his boots for inspection and the green parade ground where Robert E. Lee learned maneuvers and tactics that he used in an attempt to conquer his teacher, Uncle Sam. Perhaps it is evening and the cadets are lined up for guard mount. Buttons flash in the dying rays of the sun. The evening breeze whips Old Glory into billows of color. A canon booms, a trumpet sounds and the flag is lowered. Five hundred embryo soldiers stand at salute. It is an inspiring scene that you look down upon as you scale old Storm King.

The scenes too, are indentified with the unhappy memoirs of Benedict Arnold's trason. It was at West Point he was born. There he served as an apprentice to an apothecary before the revolution. Opposite the military academy on the Hudson the Beverly Robinson house where he made his headquarters before he turned traitor.

Storm King a Show Place

Storm King will be one of the premier show places of the country and motorists will be able to look over the precipice and wave greetings to those aboard the palatial passenger steamers plying up and down the Hudson between the metropolis and capital city of the Empire state. Besides, there is a beautiful Palisade park which, when completed, will reach from Storm King southward through New Jersey to a point opposite New York. It is intended all natural scenic beauty spots will be retained in the plans of the park and that the landscape artist be given full rein.

TOMPKINS' COVE, HIGHLAND LAKE, HIGHWAY IN ROCKLAND COUNTY, SHOWING TYPE OF ROAD CONSTRUCTION ON ROUTE TO CANADIAN BOUNDARY

C. A. A. WINS MATCH

Chicago Automobile Club Defeated in Interclub Contest

WAUKESHA AND BACK

Disqualification of Greenburg Beats Motor Organization

FEW PENALTIES ARE IMPOSED

CHICAGO, June 16—The sixth annual interclub team reliability match between the Chicago Athletic Association and the Chicago Automobile Club, run Thursday and Friday of last week to Waukesha, Wis., and return was won by the former, making its record five out of six. The C. A. A. was charged with 57 points penalty but this was reduced to 22 because of the credit of 5 points for each perfect score. The Chicago Automobile Club was demerited 515 points altogether, but it also had seven perfect scores and in addition was penalized only 9-10 of a point instead of a full point because it had ten contesting cars to the Cherry Circle's nine. This brought the C. A. C.'s final count down to 428.5.

The match brought out the finest example of sportsmanship ever exhibited in these annual matches. The Chicago Automobile Club was unfortunate enough to have on its team a man who totally disregarded the rule which prohibits the participation of women on the tour either as contestants, observers or passengers. Because George G. Greenburg carried two women passengers the first day of the tour the C. A. C. was penalized 250 points through the disqualification of Greenburg. The penalized driver refused to contest the second day unless he could carry the women passengers, so another 250 points were charged against the C. A. C.

Loaded down with this burden, the Automobile club had little chance to win, but Captain Knisely of the C. A. A., was sportsman enough to offer to scratch two of his cars and take 500 points penalty in order to even up the match. The Automobile club declined to take advantage of this and continued the contest. At the end of the match, when it developed that the Automobile club would have won if it had not been for the Greenburg incident the Cherry Circle team pleaded with Referee Beecroft to change his ruling and consider Greenburg as a noncontestant. This, that official refused to do, but he did wire the circumstances to Chairman Schimpf of the A. A. A. contest board and telling him of the wishes of the C. A. A. Chairman Schimpf, however, refused to make the change and said that the victory would be credited to the C. A. A., although the two clubs could make any disposition of the trophy they saw fit.

Outside of this unpleasant incident the contest was the most enjoyable of the series. The first day's run was to Waukesha, Wis., 135 miles, with the noon stop at Lake Geneva. Two of the C. A. C. drivers were penalized, P. E. Ennis for a motor stop and Stuart Dorsey for being late. Dorsey failed to take advantage of the rule which permits time taken for tire trouble to be added to the running schedule and kept his motor running while making a change, making him late. All C. A. A. cars were perfect.

The second day the two teams returned by a slightly different route, stopping at noon at Harvard, Wis., where lunch was served by the women of the First Presbyterian church, who feasted the clubmen on chicken, the profits going to the church. In the afternoon three cars were penalized. Ireland of the C. A. A., broke a spring near Elgin, which cost him 54 points, while Grower, also C. A. A., had to take on water within two blocks of the finish, which cost him 3 points. Dorsey of the C. A. C., drew 1 point for a motor stop. Figured on actual driving the result would have been: Chicago Automobile Club, 21.5 points credit; C. A. A., 22 points minus. The score in detail:

CHICAGO ATHLETIC ASSOCIATION

No.	Driver and Car	Score
1	C. T. Knisely, Diamond T.	Perfect
3	S. E. Hibben, Packard	Perfect
5	W. F. Grower, Diamond T.	3 points
9	C. C. Ireland, Hudson	54 points
11	F. H. Judd, Knox	Perfect
15	W. C. Thorne, Locomobile	Perfect
17	Fred Schaaf, Pierce-Arrow	Perfect
19	F. E. Mann, Locomobile	Perfect
21	L. T. Jaques, Peerless	Perfect
	Total penalty	57 points
	Total credit	35 points
	Final score	22 points minus

CHICAGO AUTOMOBILE CLUB

2	G. F. Ballou, Apperson	Perfect
4	F. W. Jencks, Moline	Perfect
6	H. W. Sehl, Cole	Perfect
8	P. E. Ennis, Marmon	2 points
10	J. E. Callender, Ed.-Knight	Perfect
12	W. C. Wilson, Moline	Perfect
16	E. C. Patterson, Packard	Perfect
18	G. Greenburg, Packard	500 points
20	J. Dorsey, Alco	13 points
22	F. X. Mudd, Lozier	Perfect
	Total penalty	515 points
	Total credit	35 points
	Final score	428.5 points

COLUMBUS RELIABILITY POSTPONED

Columbus, O., June 16—Owing to inability to secure sufficient entries and also to the bad condition of bridges, due to the recent floods, the Ohio State Journal Reliability contest which was to have taken place June 10, will be postponed until July 22. It is not certain if the contest will be held upon that date, depending on the number of cars entered. The contest will be under the charge of the contest committee of the Columbus Automobile Club.

ALGONQUIN CLIMB POSTPONED

Chicago, June 16—The annual Algonquin hill-climb of the Chicago Motor Club, which was scheduled for next Thursday, has been postponed. The reason given is that the hill is not in shape because of a new sewer that has been put in. Lack of entries is another reason for the postponement.

COAST LIST FILLS

Thirty Starters Promised in Indiana-Pacific Tour

NEW ENTRIES DECLARED

Pilot, Marmon and Another Premier Late Nominees

PLANNING LONG JOURNEY

INDIANAPOLIS, June 17—At least thirty cars will check out of Indianapolis the morning of July 1 and start for California in the annual tour of the Indiana Automobile Manufacturers Association according to the predictions of the most conservative of the promoters. Four additional entries—an Empire, a Pilot 60, a third Premier and a Marmon—were made this week, bringing the total nominations up to twenty-two, and more have been promised before the lists close June 22.

The Pilot 60 is entered by the Pilot Motor Car Co. of Richmond, Ind. The third Premier entry, which will bear No. 21 on its hood, will be driven by A. L. Westgard, who has crossed the continent several times charting routes for the American Automobile Association.

The Marmon, the latest entry received, was nominated by Carl G. Fisher who will make the trip in person to study road conditions relative to his plan of building a national rock highway between New York and San Francisco. The Marmon will be driven by Joe Dawson, winner of the 1912 500-mile race.

The tour has aroused so much enthusiasm among the various entrants that it has been decided by many of the factory officials to take their families along although not as a part of the tour proper. A special Pullman will make the trip to the coast and make stops at various points en route so that those aboard may meet the motorists in various places of interest. The special will leave Indianapolis July 4, just 3 days after the motor cars check out of Indianapolis.

MULFORD TO RACE THE PEUGEOT

New York, June 16—The Peugeot Import Co., 1620 Broadway, New York city, announces that Ralph Mulford will drive the Peugeot racer which won the 500-mile sweepstakes at Indianapolis, May 30, in practically all the big American speed contests this year. The car has been purchased by a wealthy sportsman who is interested in racing and who has arranged with Mulford to drive it.

ENGLISH ROAD RACE OFF

London, June 8—Lack of entries has resulted in the abandonment of the Tourist trophy road race which was to have been run on the Isle of Man in September.

PATHFINDER ON WAY

Mitchell Blazing Trail for National Reliability

GOPHERS AFTER ENTRIES

Promotors Expect to Have Big Field of Starters

MAKING PLANS FOR TOUR

MINNEAPOLIS, MINN., June 16—The Mitchell pathfinder for the annual national reliability tour of the American Automobile Association left at 2 p. m. today. Frank Zirbes was driver. Dick Tucker, representative of the F. E. Murphy Automobile Co., which is distributor for the Mitchell; W. F. Forman of Chicago and C. A. Stedman of the entries committee, accompanied the pathfinder on the trail-blazing trip.

The R. W. Munzer Sons Co. has entered a Hupmobile and the Fawkes Automobile Co., two Reos, in addition to the Metz team from Boston and the Krit team from Minneapolis. Several individual entries are on the list, of which L. W. Hill of St. Paul, was the first to qualify. He will drive a Packard car.

The Automobile Club of Minneapolis, was host at a motion picture show illustrating life in Glacier park and showing the 1911 Minnesota tour passing through Prickly Pear canyon, Monday night. A. G. Batchelder of the executive board, was present as well as Dr. C. E. Dutton, chairman for the tour.

Arrangements for the hotel train on the tour July 11-19 are ready. To enable motorists to go from Glacier Park station to Belton, at the eastern end of the park without driving down to Helena to get over the ridge of the Rockies the Great Northern road will make a freight rate of $5 per car for the trip. From Bolton the tourists who wish, may travel down the Park-to-Park trail to Kalispell for the Montana good roads meeting, thence down the trail to Missoula and through the Bitter Root Valley, or to Yellowstone park. Other lines will meet the Great Northern rate for the return of the motor cars by freight from the park to the initial point of $50 a machine. Tourists therefore, can return by the Northern Pacific and by other routes, or overland, at will, after the tour is over.

Aboard the train will be a photograph developing plant, a welding plant, news paper outfit, tire repairs, accessories, bats and other facilities for enjoyment, convenience and comfort. The train will have standard sleepers with the usual equipment of the Oriental Limited and the dining and observation cars will be equally comfortable. Tents at night patrols will enable the tourists to sit outside and watch the various entertainments to be provided by the hospitable Montanas and North Dakotans along the line for the entertainment of the tourists.

With typewriters for correspondents, barbers, physicians, valet shop, electricians, railroad car inspectors, a corps of detectives under the supervision of the chief of the road's department it is believed every feature suggested has been covered. After the first 2 day's run a stop of 24 hours is to be made at the lively city of Fargo, N. D. This will enable the travelers to get the motion of the trip and experience has proved the system invaluable in the northwestern part of the country.

Passengers or any member of the tour may ride at will on the train, which will be at night and noon controls at local fares between stations. This privilege will make it more feasible for entrants for the social end of the tour to take members of their families with them.

TACOMA GETTING RACE ENTREES

Tacoma, Wash., June 12—Thirteen entries already have been received for the Golden Potlatch trophy race which will be the feature of the July 5-6 meet. The list includes: Fiat, Tetzlaff; Benz, Burman; Benz, Carlsen; National, Taaffe; Stutz, Cooper; Stutz, not announced; Stutz, Cameron; Locomobile, Welsh; Tulsa, Hughes; Mercer, Oldfield; Apperson, Nickels; American, McLeod; Cole, Hooper.

The Golden Potlatch trophy, given by the Seattle Carnival Association stands 22½ inches high from tip to base, with a bowl measuring 8½ inches across and a diameter of more than 14 inches at the handles. Above in relief is etched a motor car speeding over the course, with Mount Tacoma in the distance, while underneath in raised oxidized letters is the inscription. In further carrying out the design to correspond with the Indian nature of the potlatch, totem poles are used for the handles and the potlatch bug, together with the eagle and emblem of the Tilikums appear conspicuously.

FAIRMOUNT RACE KILLED

Philadelphia, Pa., June 11—By a vote of 8 to 2 the Fairmount park commissioners today rejected the petition of the Quaker City Motor Club for the resumption of road racing in the park. Mayor Blandenburg, while he opposed the race, did not vote, in accordance with his statement made some time ago, that if councils favored the race, he would not vote against the proposition. The principal argument advanced against the race was an opinion from City Solicitor Ryan, read by the mayor, in which it was pointed out that in case of accidents, the city would be legally responsible for damages. Director of Public Safety Porter, also objected to withdrawing 1400 policemen from the city and transferring them to the park to safeguard the course during the progress of the race.

ARGYLL'S NEW MARK

British Car Makes Thirteen Records at Brooklands

TWO ATTACKS MADE

Second Trial Results in Startling Performances

THREE DRIVERS ARE USED

LONDON, June 4—Herewith are further details of the successful attack on world's records by the sleeve-valve Argyll at Brooklands, on May 19 and May 27, cable reports of which were published in previous issues of Motor Age.

But one world's record was established by Scott and Hornsted in their drive of May 19, the 12-hour record which they increased from 910 miles 1738 yards to 914 miles 604 yards, averaging 76.2 miles an hour. The other twelve records were hung up on May 27, when J. H. Toop acted as relief driver to Scott and Hornsted, and took the wheel of the Argyll after 1,000 miles had been covered, thereby receiving credit for shattering the 14-hour record.

In the remarkable drive of May 27, quite a lot of trouble was encountered. Tire changes and punctures were conspicuous in the early part of the speed trial, bad luck was experienced when a plug porcelain cracked and a gasoline line and pressure gauge broke, necessitating a delay for repairs. Moreover, the heat was intense and the drivers were forced to wear smoked glasses to lessen the glare from the oil-soaked track. While Hornsted was driving, there was a cloud burst and he had to slow down considerably while circling the track in a heavy hail storm.

Much of the credit for the record-breaking is due the Dunlop tires with which the car was equipped. When the tires had done their allotted period, they were taken off to cool and then put on the car again. In three of the cylinders the same plugs were in use as were utilized for the bench test of the motor before it was placed in the car. The condition of the chassis at the conclusion of the straining run was remarkable.

The world's record's established by the Argyll in its two drives during May are as follows:

Distance miles	New Record	M. P. H.	Former Rec.
600	7 :40 :49.63	78.12	7 :57 :59.55
700	9 :06 :53.76	76.8	9 :16 :34.02
800	10 :23 :14.67	76.4	10 :34 :29.88
900	11 :49 :18.61	76.13	11 :52 :03.20
1000	13 :05 :45.68	76.36	13 :08 :25.10

HOUR RECORDS

Time hours	New Record miles	yards	M. P. H.	Former Record miles	yards
7	544	1171	77.81	525	568
8	622	523	77.79	602	971
9	690	1284	76.74	678	158
10	766	1504	76.69	757	248
11	837	598	76.12	832	1704
12	914	604	76.20	910	1738
13	992	483	76.33	987	1548
14	1070	57	76.43	1016	437

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Why Motor Car Tires Wear Out

ONE of the great reasons for early tire destruction with many car owners is under-inflation. The owner has his tires properly inflated at the end of the week. The tire gauge shows 75 pounds. Four or 5 days later they look to be very nearly as well inflated, and a week later little deflation can be noticed. When the tire gauge is again put on he is astounded to find that the pressure is down to 25 pounds. He has been riding his tires at a great under-inflation and has been entirely ignorant of it. The only remedy is a more general use of the pressure gauge. The eye cannot be depended upon. With the car empty the tire does not apparently flatten out as might be expected when the pressure is so low. Were the tires examined with a full load and when rolling on the road the under-inflation would be much more quickly recognized. It will be dollars and cents in the pockets of owners to carry pressure gauges with them and see to it that once a week all tires are tested and brought up to the inflation recommended by the tire makers. Tire manufacturers are losing a golden opportunity in not waging a more continuous campaign along this line. Get the tire gauge habit and thus put money in your own pocket through this precaution.

CAR owners should get another tire habit, the crack-filling one. The tread of a tire will get cut and crack ¼ or ½ inch in length. At first these are innocent looking incisions, scarcely noticeable, particularly when the car weight does not rest on that part of the tire. But these little incisions become more alarming when against the road surface, at which time they open up and actually suck in the dust and small pieces of flint from the road surface. If the road surface is wet they suck in moisture, often water. The small pieces of flint, together with the moisture, are constantly at motion within the tire as the wheel revolves and that part of the tire containing them comes in contact with the ground.

SUBSURFACE working soon begins. Instead of a surface cut there is developed a subsurface space, perhaps between the tread and the canvas layers. The water gets in and soon it finds its way into the canvas. It gets between the threads or strands of it and waterlogs it. A little later the miniature gravel particles find their way into the canvas and between the strands and do their quiet work in cutting the fibers of the strands, thus generally weakening the fabric. This work keeps spreading and a close examination soon will show that the tread part is separating from the fabric portion, and the further the separation takes place the more water and dirt enters and the quicker the pace of destruction. It is amazing how quickly it does take place and how much damage it does.

IT is a stitch-in-time program that will avoid the inevitable. The tires should be inspected hurriedly after each day's service. It only takes a fraction of a minute for each wheel. Two minutes will do for an entire set. If a small crack or even a hole caused by a nail or piece of wood is discovered, it should be repaired at once. Clean the hole with gasoline, remove all the dirt, then wash it again with gasoline. This done, fill it with any of the plastic tire repairing compounds on the market. It is a very simple job and one that will rarely have to be repeated. The filler has to perform but one service, namely, keeping the water and dirt out of the tire.

SUCH service will pay the car owner a higher rate of interest on money invested than a score of other details about the car. This surface-filling habit, together with the tire-gauge habit, is worth dollars annually to the car owner.

AT this time, the opening of the touring season, there are a few other precautions that the car driver should exercise for the protection of his tires, First of all, watch out carefully for sharp stones and boulders. Don't strike them with the tire when traveling at any speed and particularly when at higher than 20 miles per hour. Striking the sharp-edged boulder will make a cut in the tire and striking the round boulder a glancing or straight-on blow will bruise the tire, perhaps sufficiently to cause a rupture in the fabric or a separation of the fabric and the tread portion. The fact that a tire does not blowout or even puncture when such a blow is struck is no reason why the tire has not been injured. The injury is there and will surely present its case within the next 500 or perhaps 1,000 miles. Such treatment easily will take 1,000 miles off the useful life of a tire.

IT is equally disastrous to strike the sharp edges of street car tracks at right angles at too high a speed, particularly if the tracks are 1 inch or more above the level of the road surface. A severe strain is put on the fabric by such treatment, often some of the strands are broken.

SO many car owners and drivers fail to realize that the fabric strands of a pneumatic tire are inextensible measured circumferentially, a fact so ably explained by J. B. Dunlop, inventor of the pneumatic tire, in his comments before the recent session of the Society of Automobile Engineers. Mr. Dunlop's first aphorism relative to the tire was that the successful pneumatic must be absolutely inextensible circumferentially and also at right angles to this direction, but resilient radially or in the direction of the wheel spokes. Keeping this fact in mind, the driver must not imagine that when he strikes a stone at a speed of over 20 miles per hour, that the fabric just bends to the shape of the stone as would a sheet of fairly loose cloth in which you plunged your hand; rather the canvas is at its maximum tightness and when a severe blow is struck it is similar to striking too hard the tight string on a violin. The string breaks. So does the canvas. If the canvas does not break it is often stretched to exceed its limit of elasticity and its life is destroyed, the same as when you stretch a piece of elastic so far that it fails to return to its normal size after the power has been removed.

GET the driver, the owner-driver and the car owner to have due regard for the unseen fabric of the tire. Keep it in mind when traveling at speed in roads in which there are occasional sharp or other boulders; keep it in mind when striking street car tracks; keep it in mind when traveling over a wornout asphalt road which is full of pot holes 10 or more inches in diameter and 3 or 4 inches deep; keep it in mind when traveling over wornout brick pavement which is filled with holes caused by one or two bricks distintegrating; and keep it in mind when running on street car tracks, nearly all of which have small sharp cuttings, which are scarcely noted but which prick the surface of the tire, often entering deep enough to partially cut some of the strands of the fabric.

Vermont Against Red Lights in Rear

Law Passed Because of Railroad Men's Objections

MONTPELIER, VT., June 14—Vermont has taken the initiative in legislating rear lights showing a red disk off the highways in deference to the requests of locomotive engineers. Within the past few months engineers on some of the trains when rounding curves have suddenly seen a red light loom up at night, and after jamming on the brakes and stopping short discovered it was a motor car on a highway close to the railroad tracks. This happened a few times with the fast Boston and Montreal express, one of the big trains in New England and so complaints were made to the highway commissioners in some of the New England states.

The Massachusetts highway commission has promised to take the matter up before the next legislative session so that the example set by Vermont will be followed undoubtedly by all the other New England states next year. The Vermont law provides that from 45 minutes after sunset to 45 minutes before sunrise lights shall be displayed, but that no rear light show red on any vehicle using the highways. It also provides that this act shall take effect January 1, 1915, but if New Hampshire, Massachusetts, New York and Quebec shall pass laws prohibiting such red lights the law shall take effect on the same date as specified in those laws, making it, therefore, operative at once. No penalty shall attach to violation of this law until the secretary of state issues a proclamation putting it into effect.

The Vermont legislature also changed the law so that the secretary of state now has more power in the suspension and revoking of licenses, and he is provided with investigators to delve into accidents patterned after the Bay state law. This gives the secretary of state power to rule off the highways such persons as he deems unfit to drive motor cars. It provides for hearings when such drivers ask the judges for them.

The section of the Bay state law providing that operators must stop when commanded to do so by police officials and showing their licenses when asked by the officers, under penalty of a fine as high as $100, has been incorporated into the Vermont law by the last legislature. Another new section prohibits the use of false number plates. The furnishing of plates to motorists has also been amended to make the operation of the law uniform with the other states nearby.

The jurisdiction of the highway commissioner has been enlarged to give him coordinate authority with selectmen in the maintaining of highways, so the commissioner may direct that certain work be done under penalty of fine for refusal. The highway commissioner also is empowered to have the selectmen of a town take material for highway construction from any land when needed, and if the owner of the land objects they may take the material and appraise it and pay for it. The law also is amended so that money for roads shall not be spent on bridges or culverts, the towns having to pay for this. Nor shall the money for maintenance be spent in the removal of snow or ice.

The legislature also passed a law limiting the weight of motor trucks. It provides that no vehicle, including its load, shall be moved over the highways or bridges in excess of 5 tons without first obtaining a written permit. No vehicle that has flanges, ribs, clamps or other objects attached to the wheels that will cut into the roads or bridges to any considerable depth may be moved over the roads. Towns may recover for any damage done by such vehicle unless the driver is relieved of the liability.

No steam or gasoline traction engine, with or without trailers, and no motor truck carrying a weight in excess of 4 tons, including the vehicle, may be operated on highways or bridges at a speed greater than 15 miles an hour; no vehicle, including its load, weighing in excess of 6 tons may go faster than 6 miles an hour, when such vehicle is equipped with iron or steel tires, or faster than 12 miles an hour when equipped with hard rubber or other substance. The fine for violation of this provision is not more than $200.

Thirty-Six Machines to Start in French Cyclecar Race

PARIS, June 4—Final entries for the French cyclecar grand prix race at Amiens next month have just closed with a total of thirty-six machines. These comprise twenty-five cyclecars of 1,100 cubic centimeters cylinder capacity; one of 750 centimeters; seven cyclecars or sidecars of 1,000 centimeters; one of 750 centimeters, and two of 500 centimeters.

All these machines will race together, but there will be distinct awards for each class. This is the first occasion on which cyclecars have been united for a pure speed contest on the open road. Doubtless as the result of this contest this already popular type of vehicle will experience a boom.

Practically all attention has been centered on the 1,100 centimeter class—67.1 cubic inches—showing that this type of machine is the one with the greatest future. Sidecars, which are exceedingly popular in England and have met with a little favor in France, are allowed to race with the cyclecars. Nevertheless, only six of these machines have been entered. A team of four Morgan machines, which are officially placed in the sidecar class, are really three-wheel cyclecars. The French regulations, however, do not consider three-wheel machines as cyclecars.

Considerable variety is to be found in the machines entered for the race, and as there is no previous contest to serve as a starting point, it is difficult to predict a possible winner. Bedelia heads the list of entrants with four machines. These are twin-cylinder air-cooled models, three of them having a bore and stroke of 3.2 by 3.9 inches, giving the maximum cylinder area of 67.1 cubic inches, and the fourth one is also a twin of 2.9 by 3.2 inches bore and stroke.

These machines are pure racing types with a single chain transmission to a countershaft from which final drive will be by belts to the rear wheels. As there is only one slight hill on the course, it is probable that these machines will have no change-speed mechanism. Driver and passenger will sit tandem fashion, the passenger being almost entirely hidden from view and the driver having only his head and shoulders above the body of the car.

Automobilette has two cars in the race, both having a twin-cylinder water-cooled motor of 2.8 by 5.1 inches bore and stroke. Ducruzel's machine will be built with no other object than speed, the car comprising the motor, chain transmission to countershaft, and final drive by belts to the rear wheels. A certain variation in gear ratio will be obtainable by the use of expanding pulleys. This car has a narrow track, a very narrow radiator, and pure torpedo-shaped body. The mechanician is seated slightly to the rear.

The second Automobilette, to be driven by Choudy, is out for regularity, and although the motor is the same as that on the racing machine the same accessories are to be found as on the stock car. These are a shaft drive from motor to countershaft, with a two-speed and reverse gearset, then final drive by belts and expanding pulleys.

Sphinx-Globe, also with two machines, will have two different types. One will be driven by a single-cylinder Anzani air-cooled motor of 4 by 5.1 inches bore and stroke, and the second by a Jap twin water-cooled motor, 3.5 by 3 inches.

Paris Names Definite Show Dates

Salon to Be Held October 17-27, 1913

PARIS, June 4—Paris will this year open the European show season with its annual exhibition in the Grand Palais, the inauguration of which has been fixed for Friday, October 17, and the closing day for Monday, October 27. The show will thus be open 11 consecutive days, including two Sundays.

The date chosen for this year's show is the earliest yet adopted for any motor exhibition in Europe. Henri Cezanne, who will again act as general manager of the Paris show, declares that this early show will allow the factories to gain practically 2 months. In France there is no important fall trade such as the American manufacturers enjoy. Thus, as soon as the active touring season is over there is a slackening off in factory activities and work is not taken up at full pressure until after the Paris show.

In its main features the Paris show will be similar to that of last year. It is organized by a joint committee representing the five leading trade associations of France, and is run on a profit-sharing basis. Both passenger cars and commercial vehicles are admitted, but the machine tool section has been abolished for lack of space. Accessory dealers are divided into two distinct classes: Those manufacturing the goods they show, and those who are merely agents for other firm's goods.

The minimum size of stands has been increased to 107 square feet, this having been done to make the cost of exhibiting too high for small dealers whose goods had but a slight connection with the motor car. The maximum size of stands is 861 square feet on the ground floor and 645 square feet on the first floor.

All firms taking part in the Paris show must sign an agreement not to exhibit at any other show during the year in France or Algeria.

ENGLISH ENGINEERS GO HOME

New York, June 17—The small part of the members of the British Institute of Automobile Engineers which completed the itinerary as laid down in the official program arrived here last Saturday. The party began to break up when the boat landed at Detroit after the lake session of the S. A. E. and I. A. E. At this point Messrs. Bennett, Buist and Ker dropped out. The next breaking up point occurred at Cleveland, where the party separated into three, a third making the New England trip, a third going to New York and the rest scattering. Those making the New England trip were T. F. Benson, L. A. Bollack, J. B. Dunlop, C. A. Bramston, J. B. Ferguson, E. Wooler, R. W. Smith, senior and junior, E. C. Paskell and Mr. and Mrs. E. B. Wood. Smith and Paskell dropped out of the New England party to make the trip to Springfield to see the works of the Hendee Mfg. Co. where the Indian motorcycles are made.

One convert has been gained to the ways of America. E. Wooler has accepted a position in the drafting rooms of the Continental Motor Mfg. Co. and has gone back to Detroit. C. A. Branston is making the Indiana to the coast tour which starts July 1. T. C. Pullinger has returned to Detroit to make a further study of the plants in that city. J. B. Ferguson, Gilbert Moore, J. B. Dunlop, D. W. Smith and son, Charles Wheeler, Ed. B. Wood and wife sailed Saturday for home.

HARTFORD IN NEW PLANT

New York, June 16—In Jersey City last week, the Hartford Suspension Co. celebrated the full and complete operation of its new plant for the making of Hartford electric starters and lighters, for while the eight-story building has been turning out the devices for the past 4 months, all the machinery had not been installed and all the departments in full working order until a week ago. The new building is of concrete, steel and glass. It is eight stories high, the floors being 12 feet high. The floors are of granolithic construction. The building is 94 feet wide, extending back 85 feet, giving a space on each floor of about 8,000 square feet or a total of 64,000 square feet.

ALCO TRUCKS FOR POSTAL USE

New York, June 16—The New York postoffice department has placed an order for eighty 3½-ton Alco trucks, representing an investment of approximately $225,000. The fleet of trucks was purchased by the Postal Transfer Service, Inc., which has the government contract for carrying United States mail in New York. Not only will the trucks handle straight mail, but they also will take care of greatly increased volume of matter, due to the recent parcel post laws.

BADGERS SET TOUR DATES

Milwaukee, Wis., June 16—The fourth annual Wisconsin reliability tour under the auspices of the Wisconsin State Automobile Association will be held on August 18, 19, 20, 21 and 22, 1913, over a course of approximately 800 miles. The run will be held under grade 1 rules, it having been advisable to go back to regulations which will insure a strenuous competition rather than a pleasure trip. M. C. Moore will start Friday on the pathfinding trip in a Mitchell 6-60. The route for the 1913 tour will be as follows:

First day—Milwaukee to Sheboygan, Fond du Lac, Oshkosh, Appleton, and Green Bay.
Second day—Green Bay to Shawano, Antigo, Rhinelander and Merrill.
Third day—Merrill to Athens, Abbotsford, Owen, Stanley, Chippewa Falls, Eau Claire, Whitehall, Galesville, LaCrosse.
Fourth day—LaCrosse to Sparta, Reedsburg, Baraboo and Madison.
Fifth day—Madison to Janesville, Delavan, Lake Geneva, Racine and Milwaukee.

An excellent entry list is assured for the run. Many Milwaukee dealers who kept out of the tour last year because grade 3 rules governed, will come back this year and engage in the competition.

SPARKS WINS SYRACUSE RUN

Syracuse, N. Y., June 14—Edward F. Sparks, driving a Franklin, won the secret time sociability run of the Automobile Club of Syracuse, held today. The official time was 2:57:30 and Mr. Sparks was just 12 seconds out of the way covering the route in just 2:57:18.

This gives him possession of the B. E. Watson cup for 1 year and it is planned to have Mr. Sparks and the three previous winners of the cup hold a contest next year, the winner to have permanent ownership of it. The other winners, the time and the cars they drove were as follows:

Second—Simon Rosenbloom, 2:56:47; Hayes.
Third—A. J. Conine, 2:58:05; Buick.
Fourth—Louis Leonard, 2:55:47; Krit.
Fifth—G. F. E. Meistering, 3:00:03; Abbott-Detroit.
Sixth—C. A. Lawton, 2:54:50; Franklin.
Seventh—Edward C. Heise, 2:54:25; Cadillac.
Women's Prize—Miss Edith Gere, 2:59:05; Ford.

PORTLAND PARADE WINNERS

Portland, Wash., June 15—Decorated with garlands of flowers and yards of billowy silk and ribbons, more than 200 cars participated in the motor car parade held in connection with Portland's annual floral festival last week. The parade was in four divisions—touring car, runabout, electric and clubs and organizations—and Oakland, Pasadena, San Diego, Spokane, Seattle, Tacoma and Vancouver were represented with motor floats. The prize winners were as follows:

Touring Car Class—Mrs. Helen Ladd Corbett, first; G. W. Baldwin, second; Mrs. L. Payton, third.
Runabout Class—Mrs. Elliott Corbett, first; Miss Alice Gadsby, second; H. Von Cleff, third.
Electric Class—L. H. Reese and Frank C. Riggs, first; Mrs. Charles Venable, second; Miss Ella Holme, third.
Clubs and Organizations—Bell Telephone Co., first; Oakland, Cal., second; Portland Rotary Club, third.

The Bell Telephone Co. also was awarded the grand prize for the most artistically decorated car.

Members of the Portland fire department, led by Chief Dowell and the fireman's band, had nineteen cars in line, the fire apparatus being hung with garlands of roses.

NEW PACKARD TRUCK MODELS

Detroit, Mich., June 17—The Packard Motor Car Co. has added two more models to its line of motor trucks, these being of 4 and 6 tons capacity. Heretofore models of 2, 3 and 5 tons capacity have represented the company in the commercial car field, and the newcomers will thus broaden the range. The specifications of these two new Packards are along the same lines as the others and show no deviations from the company's truck practice. The motors develop 32.4 and 40 horsepower, respect-

ively, according to the S. A. E. rating. They are T-heads and transfer their power conventionally to jackshafts, the final drive being through side chains.

TO MAKE ONE LICENSE DO

Washington, D. C., June 17—A bill of importance to motorists was introduced in the house today by Chairman Adamson of the committee of interstate and foreign commerce. It provides that motorist or operator of any self-propelled vehicle using the public highways in interstate commerce shall be required to take out only one license. If the bill becomes a law the license of one state, district or territory must be recognized by all others in the country.

MISSISSIPPI TO REFUND TAX

Jackson, Miss., June 16—Special telegram—With the refusal today of the supreme court to grant a suggestion of error in the motor tax case the last chance to save the privilege tax measure has passed. The $30,000 collected by the state will be refunded by a special act of the next legislature. The supreme court recently declared unconstitutional the privilege tax which has been imposed on all classes of motor cars.

BADGER CODE PASSES SENATE

Madison, Wis., June 16—The Wisconsin senate has passed the Martin bill, known as the Wisconsin State Automobile Association's motor code, and the chances for its passage by the assembly are considered good. One of the features of the bill is the provision for automatic regulation of traffic at street intersections. The traffic approaching any driver from the left has the right of way. The bill was framed by James T. Drought, father of all Wisconsin motor legislation and now president of the Wisconsin State A. A.

PROMOTION FOR REDDEN

Detroit, Mich., June 18—Special telegram—Announcement is made by Walter E. Flanders of the Maxwell Motor Co. of the appointment of Chas. F. Redden to the position of general sales manager of that concern. Redden has been New York district manager for the Maxwell Motor Co. and formerly was manager of the New York Studebaker branch. C. A. Forster, commercial manager of the Maxwell Motor Co., will retain that title, and while reliquishing the sales managership will take up the more weighty matters that formerly came within the province of W. F. McGuire, who recently resigned. It is understood that Mr. Forster will leave shortly for Europe to look after the company's foreign interests.

Barkman Joins Hupp Forces

Detroit, Mich., June 17.—A. B. Barkman, a pioneer in the bicycle and motor industry, has resigned as assistant commercial manager of the Maxwell Motor Co. Inc., to become western sales manager of the Hupp Motor Car Co., with headquarters at San Francisco. Mr. Barkman has been identified with the Maxwell company since 1906.

Electric Gearshift for 1914 Haynes

Kokomo Concerns Announces New Features

KOKOMO, Ind., June 17—The Haynes Automobile Co. of this city has today announced that it will equip its entire 1914 line, consisting of four and six-cylinder models, with the Vulcan electric gearshifter, which device the company has tested out on its six-cylinder cars for several months to its utmost satisfaction.

This announcement of America's pioneer maker fitting a gearshifter device as stock lends much force to the arguments advanced favorable to some form of gearshift other than the lever. Although the Haynes company has this equipment stock it will fit the lever-shift system if requested, and in which case the gearshifter quadrant will be under the car floor and the lever in the center of the floor board for right hand operation.

In experiments extending over months the electric gearshifter has given entire satisfaction, the engineering force claiming successive hundreds operations without a miss. In recent tests it has made over 500 changes in a single day without difficulty.

The control of the gearshifter is on a circle above the steering wheel. On this circle are seven buttons for use as follows: Three for forward speeds; one for reverse; one for neutral; one for the electric starter; and one for the electric horn. Pressing a button takes the place of the gearshift lever.

The Haynes company has had the question of electric gearshift under consideration for some time and was the second motor car concern to sign contracts with the Vulcan people for its equipment. The operation of this gear-shifting arrangement was illustrated and described in Motor Age, April 10, pages 30 and 31. In this device solenoid coils are employed as the system of control. There is one of these coils for each speed. Two speeds cannot be engaged at once because each speed is governed independently of the others and an interlocking device provides that no two buttons in the control can be down at the same time. Should the second speed button be set and the driver decide that he wants to go into third, he merely preses the third speed button, which returns the second speed one to its normal position. Pressing the neutral button leaves all of the others normal. Specific details concerning the exact method of application will be published later.

The Haynes company will market two 1914 models, a four and a six, both alike in general details of design and using the same cylinder sizes, 4¼ inches bore and 5½ inches stroke. The cylinders are cast in pairs and have the valves on one side only as introduced on the 1913 six-cylinder model. Ignition is by Simms magneto with one set of plugs. Pressure gasoline feed is introduced, the gasoline tanks being supported on the chassis in the rear. Pressure is maintained by an automatic air pump driven from the camshaft and there is also a hand pump on the dash. Lubrication is by a circulating splash system.

In the motors bearing surface for the crankshaft has been given good attention. On the four-cylinder car, three bearings are used, giving a total bearing length of 11½ inches. The crankshaft is 2 inches in diameter and the 11½ inches length is distributed 3¾ in front, 2½ for the center and 5¼ at the flywheel. On the six-cylinder model four bearings are used, giving a total bearing length of 14 inches, the dimensions being practically the same as in the four excepting that an additional center bearing is used.

The chassis details incorporated the standard Haynes contracting type clutch. In the four-cylinder car the McCue axle is used in front and rear, on the six-cylinder Timkens.

An entire new line of bodies has been added, these being die-formed types in which a cowl is used. The cowl curves down and meets the hood which is in reality a continuation of it. A clean-cut appearance is obtained by not using side-dash lamp brackets, rather the dash lights are carried on unions which attach to castings within the cowl. The clean-cut appearance is further accentuated in that there is no visible support for the windshield on the cowl, but nevertheless it is secured to a casting within the cowl. The cowl on all models is alike and is a one-piece die-formed part.

On the four-cylinder cars open bodies are made with two, four and five-passenger capacity. On the six-cylinder chassis open bodies are made for two, four, five, six and seven-passenger capacity. The six-cylinder chassis is made with two wheelbases, one 130 inches, and the other 136 inches. The limousine body is fitted to the latter. On both fours and sixes a line of four-passenger coupe bodies is supplied, these being from Biddleton & Smart.

Externally, all bodies are given a cleaner appearance in that the running boards are entirely free from incumbrances. The battery used for lighting, starting and gear shifting is located under the chassis. It is claimed to have adequate capacity for 1,200 starts and approximately and 4,000 to 5,000 gearshifts, the current consumed in gear shifting being very slight. A full electric lamp equipment is used.

International Election

New York, June 17—An election which has just been announced by the International Motors Co. makes a change in the higher officers of the company. John Calder, former first vice-president, has been elected to the presidency of the concern and R. E. Fulton becomes the first vice-president. Mr. Fulton formerly was the general sales manager.

Paid for Finding Fault

Before entering the paint department each body is inspected inch by inch

TO the average owner of a motor car factory tests and inspections are rather vague terms, and have little meaning other than a sort of road test of the completed car and perhaps a hazy notion of horsepower tests of the motor. Of the hundreds of inspections and tests of the parts and materials which make up the completed vehicle and the reinspections after each stage of the manufacture of the part, the common run of owners have little conception.

These multifarious and rigid inspections and the great accuracy which is required in the parts of the high-grade cars constitute an imposing item of expense. If any one part were followed through the factory from the time it arrived on the receiving platform till it was incorporated as a part of the finished product, the wonder would be not that good cars cost so much but that they can be sold so low.

There is no more positive evidence of the general desire among American manufacturers to deliver to the buying public a dependable product, honestly made than the general interest in inspection methods. There should be no more satisfying proof to the buyer of a motor car that the vehicle represents the utmost possible limit of safety for himself and his family than the knowledge that its construction has been safeguarded at every step, from raw material to the finished assembly.

Packard Inspection

The Packard car is representative of that type which has come to be known as high-grade cars, and an idea of the stringent tests that must be passed and the close limits set for the different parts of this type of car, can be gained from the methods employed in the Packard factory as outlined by E. F. Roberts in a paper delivered by Russell Huff last week before the Society of Automobile Engineers at their summer meeting during their trip on the great lakes.

Every possible test for the various portions of the cars makeup are employed, from the chemist's test tube to the massive steam hammer, according to Roberts, who says in part:

When material is received a sample is tagged with the date, grade of metal and the purpose used for, and forwarded to the laboratory for analysis. The laboratory is exceptionally complete and well equipped for analytical and physical research. It is in charge of a chemist and engineering specialist of wide experience; and every imaginable determination required in industrial engineering can be covered in this department from the crystalline structure of the antimony content in crankshaft bearings to the tons of pressure required for the breakage test of a front axle. Special rush service can always be had from a laboratory of this description in twelve hours, although ordinarily 2 days are allowed for most of the tests.

Patterns for castings in every instance are closely checked by a special inspector before being released for use, thus eliminating chance of error as much as possible, in the initial state. As soon as the first casting from any pattern is completed it should be at once forwarded as a test sample and submitted inspection and detail checking. In the foundry test bars are run from every melt and regularly analyzed and tested for physical properties. Individual castings are inspected in detail as received, although not laid out for every operation.

Factory Inspector

In each department a central location is selected, well-lighted and convenient, and here at inspection plates are installed the head inspector and his assistants. The inspection plates used in the factory are of cast iron, 24 by 57 inches, and of massive and rigid construction. They are planed and finished on top to an accurate surface and carefully used and looked after, being covered every night with a coating of oil and frequently tested for trueness. At these sit the inspectors, provided with blue prints covering every part handled in the room and with standard or special gages for checking every operation; and to them are brought all the various lots of parts as fast as completed in each operation.

The greatest factor in quick and thorough inspection is an efficient system of gages. There is no more common fallacy in manufacturing than the assumption that a correct set of gages once issued insures accuracy of workmanship. And a pretty general fallacy is the assumption of correctness for the gages themselves. Ordinarily the micrometer is accepted as the standard of measurement. When, however, it is remembered that the average micrometer will alter merely by the heat of the hand to an extent of two ten-thousandths, it is obvious that the court of final appeal for accuracy must be a higher one and one which is not subject to error by use.

There can be no more absolute precision standard than the Johannson system of gages. A set of these gages consists of eighty-one blocks, increasing in size by graduations of one ten-thousandth of an inch. They are manufactured in Sweden, the completion of a single set requiring about five years and the surfaces when finished being so perfect that atmospheric pressure will hold a dozen of them suspended in a cluster from one held between the fingers in the same manner as though magnetized.

In addition to their almost infinite accuracy they are so impervious to variations of temperature that one of them may be carefully checked in a warm room with the most sensitive instrument possible and then after being laid on ice again checked without showing the slightest variation. These gages may be accepted as the final source of authority on the accuracy of all manufacturing dimensions. They should serve as the check for all master gages, which in turn check the shop sets.

Defectives Get Stop Notice

In the department itself, the inspectors, as soon as a defective lot of parts appears, should issue to the foreman a written "stop-notice" or warning that a certain operator or certain machine is producing work below standard. This will insure immediate attention, as it puts the responsibility squarely up to the foreman. When all the operations on a given part are completed in one department, the inspector's O. K. should be again required before they can be forwarded to the next one. There is no possibility of any lot of parts accidentally escaping inspection. The operator's pay, for every lot and every piece worked on, is absolutely contingent on the inspector's O. K. and every workman for this reason is continuously watchful to prevent negligence on the part of his department inspector. Even dishonest inspection has little incentive since the time-slips on file bear so complete a record that the responsibility for such work may be very easily determined. Thus at every step in the progress of a part it is possible to so check and safeguard it as to insure its conformity to the standard of quality.

To illustrate in detail a thorough method of supervising the maintenance of inspection standards, we may follow the development of a typical forging, the bevel driving gear, as carried through its various operations in the factory. In one respect this gear is given special inspection by receiving a supplementary analytical material test. The steel from which it is forged is given the regular laboratory analysis before being released to the forge

division, but, in addition to this, because of the importance of the part in regard to both strength and quiet running, a material test is taken on each lot of forgings received.

Chips are removed from a sample, and analyzed, and the whole lot are held until the result of the anaylsis is known. The blanks after release are heat treated and then sent to the lathe for boring and reaming the larger opening for the differential casing and turning the face of the web. The blank is then sent to the plate and the dimensions and surfaces checked. The piece is next taken to the milling machine and the four slots for the differential spider are cut. For the second time it goes to the inspector, to determine whether the slots are central, at right angles to each other, square with the surface of the web and true to size within a limit of one half-thousandth plus or minus. Next the outside diameter is rough-turned and the face angle finish-turned, making necessary the third trip to the inspection plate. Again the blank is sent to the lathe for finish-turning the outside diameter and the back angle and sizing the width of the tooth plane. This makes necessary the fourth inspection, after which, if passed, it is sent to have the face of the tooth-plane ground to the correct angle with the web. For the fifth time an inspector checks it.

Heat Treating the Gear

After plating the teeth are rough and finished cut, which makes necessary inspection No. 6. The gear is next sent to the heat-treating department and first pack-hardened or carbonized. In the carbonizing pot along with each lot of gears is placed a test piece of the same material as the gears, about 6 inches long and ½ inch square. After the specified interval for this grade of steel, the gears and test bar are removed, cooled and reheated for hardening. After hardening they are cleaned and the test bar is broken and checked for depth of case, fineness of grain and general structural appearance, as an index of the internal condition of the gears. The gear is now ready for the most important of all its inspections, the strength and hardness test.

Hardness is measured by the scleroscope, which compares the condition of the part with that of a standard established by the Brinnell testing machine. Between thirty and forty readings are taken from each gear. Strength is determined by the hammer test, a device which permits the concentration of a heavy blow of known force on a single tooth, each gear being given this test on at least four different points in its periphery. These tests may be considered as inspections Nos. 6 and 7, and are immediately followed by inspection No. 8, which is the test applied by a special fixture for determining the amount of possible distortion due to heat. This inspection is rigorous and minute, covering every tooth of every gear; and the gear that checks .002 of an inch eccentric on the pitch circle is rejected.

Testing the Teeth

When successfully past this inspection the gear is ready to be ground on its outside diameter and on the face of the teeth and this in turn leads to inspection No. 9. Another grinding operation on the back and face of the web and again an inspector must check the accuracy of operator and machine, this time permitting a limit of variation of only one-half-thousandth. The final grinding is the finish of the opening for the differential case, which is followed by inspection No. 11. The last machining operation is the drilling and reaming of the differential casing bolt holes, which, in inspection No. 12, are checked for size and spacing.

Not yet, however, may the gear be released as a finished part, as it may still fail on No. 13, the final inspection. This consists of a test on a special fixture again, for checking the correctness of the tooth-bearing and smoothness of roll, and but little less than perfection is required of the gear that is finally passed through. As a finished product is is obvious that a large percentage of the cost of the gear is due to the continual supervision of the inspector, but it should also be equally obvious that the result is an article as near to the ideal of mechanical perfection as the best of equipment, skill and scientific testing can achieve.

In addition to the parts inspection, which should cover every item purchased or made for the car, all assemblies from the gasoline tank drain-cock to the motor should be checked in detail, both for accuracy of relation of their parts and for operation. The minor assemblies must be checked by themselves and then later as parts of large assemblies will again be inspected for location and function.

As a part of the chassis assembly it is again due to be checked, along with the others, for perfection of adjustment in the chassis road test. Bodies should be inspected—in the beginning, part by part—wood, glass, leather and cloth. Before entering the paint departments every one must again be gone over inch by inch and every minor defect, whether dent in aluminum or check in wood, sought out and corrected. Another inspector will pass it from the paint shop into the trimming department, and an expert trimmer's inspection O. K. should be required to get it from this department back into the finish varnish room.

Before it is sent down to be attached to the chassis it must be given a last careful scrutiny for any possible defects of finish or workmanship, and in the finished car assembly department meet a chassis, which has come through only after a similar ordeal in its own paint department. After the car is assembled it should be inspected and checked with the specifications on the sales order for completeness and workmanship before being passed to the finished test department. Preparatory to the road test the motor is to be tuned up to the finest possible pitch of adjustment and inspected for quietness and flexibility before being turned over to the driver. As this test covers road performance it should be entrusted only to men of long experience.

What the Discussion Brought Out

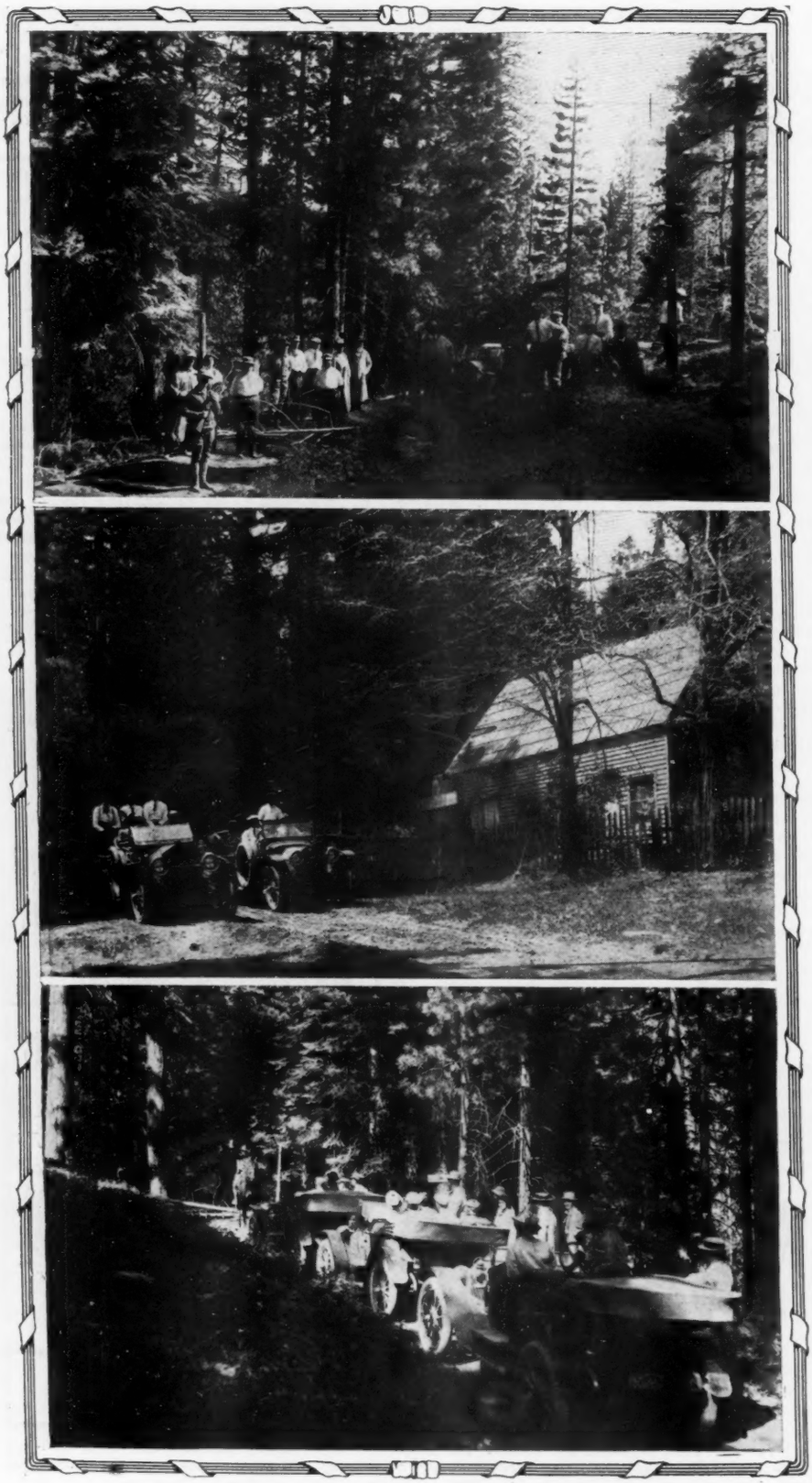
Chief among the points brought out was the relation the physical laboratory has to the inspection methods in the Packard factory. This was developed in answer to a question by F. E. Moskovics, to which Mr. Huff replied that the physical laboratory practically had been turned over to the manufacturing department. The whole plant depends upon this laboratory for its specifications which are spread around the factory in the different departments in such a way that all material are ordered in accordance with them. There is a regular form for handling the inspection.

When material is received a sample is tagged with the date, grade and purpose used and forwarded to the laboratory for analysis

As soon as a defective lot appears the inspector issues written warning that a certain machine is producing work below standard

In the foundry test bars are run from every melt and regularly analyzed and tested for strength and other qualities

Routes and Touring Information



From top to bottom—At the boundary line to Yosemite park; Hazel Green near boundary; approaching Hazel Green

Motoring Expedition Explores Yosemite Park

NOW that it has been definitely decided that the Yosemite valley is to be opened to motor cars, and that what is known as Coulterville road is the highway on which they will be allowed to enter the valley, motorists are asking what this road is like, and if they can drive over it in safety. To determine these points C. S. Howard, head of the Howard Automobile Co., Pacific coast distributor of Buick and National cars, sent two cars to the park and 3 days were spent in making a leisurely trip to the park boundary and back.

The road conditions can best be described by Fred Gross and Claud McGee, who were in charge of the expedition. Gross and McGee are both familiar with the two roads over which all of the motor travel will go when the valley is officially opened as they made two round trips over the Big Oak Flat road to the boundary of the park last year.

Expedition Sent Out

From San Francisco the Buick and National were headed for Merced over the state highway via Oakland, Haywards, Dublin, Livermore, Tracey, Bridgetown, Nanteca, Rippon and Modesto. With the exception of 2 miles between the end of the Dublin boulevard and the town of Dublin which are inexcusably bad, the roads were in fine condition to within 8 miles of Modesto. From there to Merced, a distance of 47 miles, the state highway is now in course of construction and will be finished before the end of the present season.

To avoid this construction work the scouts turned east at Modesto for 12 miles to Waterford and there turned south again to Merced. This adds about 10 miles to the mileage but it is a big saving in time until the highway is completed. The scouts spent Saturday night as guests of the Merced chamber of commerce.

The run to Coulterville via Snelling, Haywards and Blanchard, a distance of 48½ miles, was made in a little more than 3 hours. After a few minutes spent in looking around this old mining town the party again started for the park boundary which is 29 miles from Coulterville. From this point on the real mountain roads and scenery are encountered and while some of the grades are rather steep there is nothing that should cause any trouble to any modern car that is in fair condition. Of course there must be a certain amount of judgment and care used in driving over

this road, the same as must be used in driving over any road of this nature.

From the park line to the Sentinal hotel, the road descends 2,050 feet and as the descent is gradual it is hardly noticeable. There are a few sharp pitches on the grade, however, but if a little caution is used by the driver there will be no difficulty found in negotiating them. There is also a possibility that motor cars will be allowed to use the road which the owners of the Hotel El Portel are building to connect the present Yosemite-El Portel road with the Merced grove of big trees which are located on the Coulterville road about 2 miles inside of the park line. This road is to be 25 feet wide and is built on an 8 per cent grade. Its use would make the drive from the edge of the valley to the valley proper a very simple matter for the motorist.

Return Trip Uneventful

The return trip was made without incident. Sunday night was spent in Coulterville. Monday morning the regular Merced-Coulterville road was followed to Haywards where the scouts turned to Modesto via LaGrange and Waterford. From Modesto to San Francisco they followed over the same road they had traveled 2 days before. In summing up all of the available roads to the valley, Gross and McGee have the following to say:

"We believe the Big Oak Flat road is the easiest to drive over as the grades are not as sharp, although they are longer. To offset this advantage, however, the Big Oak Flat road is a toll road. The Modesto, Waterford and Coulterville road is the shortest and most picturesque road to the edge of the valley, while the Merced-Coulterville route is longer but gives one the advantage of spending the night in Merced where first class accommodations may be secured."

Gross and McGee agree that either the Big Oak Flat or Coulterville roads are entirely practical for motor travel. If an ordinary amount of care is used there should be no more danger in driving a car over them than exists on any mountain road.

Special Equipment Advised

They state that there are some few items of special equipment which are almost necessary to have on the car. They also point out several parts of the car that should be carefully looked over before starting on the trip. The following are the suggestions:

Cars which are not regularly equipped with air pressure system on their gasoline tanks should have some way provided to pump air into their tank in case the gas does not flow to the carbureter on the steepest grades. The car should be provided with an auxiliary air valve on the intake manifold with the control on the steering column. The air valve should be large enough to admit sufficient air to kill the motor and still leave the spark turned on.

Upper illustration shows Coulterville; lower, a scene on the Coulterville road

In descending the ordinary grades it is advisable to put the car in second gear and open the auxiliary air wide, while on the worst grades it is advisable to use the low gear. Using the auxiliary air and leaving the car in gear not only gives the advantage of using the engine as a powerful, air compression brake but keeps it turning over and circulating the water and oil and allows it to cool down gradually. The auxiliary air also allows one to give the carbureter more air as the elevation increases thereby loosening the tendency of the motor to heat through having the mixture to rich in gasoline.

Electric Signal Necessary

Another item of equipment which is a big factor in the matter of safety is a powerful electric alarm signal. If a car is equipped with such a signal and the signal is used, properly, collisions will be unheard of and it also allows approaching vehicles to select suitable turning out places on the grades avoiding the necessity of backing to a place wide enough to pass.

The brakes should be carefully inspected as there are a number of short sharp pitches and it is absolutely necessary to keep ones car under control at all times on this as well as any other mountain road.

Look to Lubrication

Care should also be taken to see that the transmission and differential are properly lubricated. An extra supply of cylinder oil should be carried in the car and the gasoline tank should be filled at Coulterville on the road of that name or at Chinese camp on the Big Oak Flat road. There are a number of places on this road, however, where accommodations and supplies may be secured. The last of these being Crockers, 5 miles from the boundary of the park and 7 miles from Cranes Flat where the motor cars traveling over the Big Oak Flat road will be diverted to Coulterville road and 3 miles away and thence into the valley over that road.

It is advisable to carry a couple of extra casings although there is not much chance of their being needed providing the tires on the car are in good shape at the start.

Answers to Many Route Inquiries

To Buffalo and Return

PAWHUSKA, Okla.—Editor Motor Age—I want some information on a trip to Lansing, Mich., via Kansas City, being the best I suppose, then to Detroit, by boat to Buffalo, telling how this is arranged, a side trip to Niagara, thence to Louisville, Ky., St. Louis, Kansas City and home. Give the approximate length of the trip.—C. A. Duncan.

You certainly have planned a long trip and a most pleasant one. You should go first to Arkansas City, Kan., thence through Winfield, Mulvane, Wichita and Newton. You will have to cover 218 miles to reach Kansas City, passing through Walton, Peabody, Florence, Clements, Elmdale, Cottonwood Falls, Emporia, Waverly, Williamsburg, Ottawa, Edgerton, Olathe, Martin City, Kansas City.

To reach Mt. Ayr, Ia., on the Waubonsia trail the short route will take you through St. Joseph, Mo., which is 83 miles via Leavenworth, Lowemont, Atchison, Russville; and 98 miles through Stanberry, Grant City and Redding.

The Waubonsia trail, which is very well marked, is followed eastward through Iowa to Ft. Madison, which is 185 miles, the towns being Leon, Corydon, Jerome, Centerville, Moulton, Pulaski, Mt. Sterling, Farmington and Donnellson. An 18 mile run following the west side of the Mississippi will see you in Burlington, where the Galesburg road will lead you through Oquawka, Monmouth and Coldbrook.

The next stretch to Ottawa will give you an opportunity of visiting Starved Rock and Deer Park, which can be reached by crossing the river at Utica. You will traverse the road running through Galva, Kewanee, Neponset, Sheffield, Wyanet, Princeton, Hollowayville, Seatonville, Peru, La Salle. This distance is 127 mile. It is not necessary to come into Chicago for you can route through Marseilles, Morris and Channahon to Joliet, leaving the Chicago road at this city and heading for Valparaiso through Gaugers, Frankfort, Richton, Dyer, Schererville, Merrillville, and Deep River, with 50 more miles to go for South Bend via Westville, LaPorte and New Carlisle. A 140-mile run over the main road to Detroit as far as Battle Creek, then 47 miles north to Lansing is an easy run through Niles, Summerville, Dowagiac, Paw Paw and Kalamazoo to Battle Creek, then Bellevue, Charlotte and Sevastapole to Lansing.

Practically an all gravel road of 83 miles runs to Detroit, taking you through Okemos, Williamstown, Weberville, Fowlerville, Fleming, Howell, Brighton, New Hudson and Framington.

On week days the Detroit and Cleveland Navigation Co.'s boats leave Detroit at 5 p. m., arriving at Buffalo 9 a. m. The car should be at the dock at least an hour before the boat leaves, when the car is drained of all gasoline and on arrival at destination 3 gallons are furnished free.

A new boulevard of 22 miles will give you the side trip to the Falls via St. Johnsburg.

Starting out on the return trip the Buffalo-Cleveland section of the transcontinental highway is followed, and is a day's run of 191 miles running through Evans, Irving, Silver Creek, Fredonia, Brocton, Westfield, Ripley, Northeast, Erie, Girard, Conneaut, Ashtabula, Geneva, Unionville, Painesville, Willoughby and Euclid avenue, presenting some of the handsome residences of the city of Cleveland.

Very good roads will be your luck in going to Louisville by routing first to Bellevue on the Cleveland-Toledo road, passing through Elyria, Oberlin, Wakeman, Norwalk and Monroeville, then heading south to Columbus on gravel or macadam through Bloomville, Bucyrus, Marion, Delaware, Lewis Center and Worthington. The university grounds and buildings will be of interest here as will also the state capitol building and a visit to one of the large stock farms.

Cincinnati is the next objective point and you will find the best residence section on the heights surrounding the city, where the views are exquisite. This very pretty city is reached through Grove City, Harrisburg, Mt. Sterling, Madison Mills, Washington Court House, Sabina, Wilmington, Clarksville, Rochester, Hopkinsville, Montgomery, Pleasant Ridge.

A very winding but direct road leads to Lexington, which need only be followed to Georgetown then cutting across to Frankfort and on into Louisville. Kentucky is entered at Covington, then the road passes on to Erlanger, Williamstown, Corinth, to Georgetown, then direct to Frankfort or through Lexington and Versailles, being merely a matter of personal choice. A beautiful vista is constantly before you on the drive to Louisville over a fast road through Graeffenberg, Clay Village, Shelbyville, Simpsonville, St. Mathews and Cherokee park, Louisville, with its many monuments.

You no doubt also want to visit Indianapolis, the direct road lying through New Albany, Sellersburg, Henryville, Scottsburg, Cruthersville, Seymour, Waynesville, Walesboro, Columbus, Taylorville, Amity, Franklin, Greenwood and Southport.

If dry weather prevails the remainder of your trip after reaching Terre Haute through Plainfield, Mt. Meridian, Rellsville, Brazil and Seeleyville will not be difficult, but if it is wet you will have your troubles. To St. Louis the towns are Marshall, Martinsville, Greenup, Woodbury, Teutopolis, Effingham, Vandalia, Mulberry, Greenville, Pocahontas, Highland, Collinsville; then across Missouri the route is outlined for the inquiry from Alton, Ill., in this issue.

You will find the Blue Books very useful for your entire trip. You will need a volume 5 and also a volume 4, as the division line is the Mississippi River. The roads are outlined in detail, road and city maps are given, best hotels and garages are advised, etc.

St. Louis, Mo.-Lawton, Okla.

Alton, Ill.—Editor Motor Age—What is the best route between St. Louis, Mo., and Lawton, Okla., via Kansas City.—Tourist.

The distance across Missouri is 313 miles, taking the road first to Mexico, which is 124 miles and via Wellston, Dardenne, Foristell, Wright City, Warrenton, Jonesburg, High Hill, New Florence, Montgomery, Wellsville and Martinsburg; then Marshall is 97 miles through Clark, Renick, Higbee, Armstrong, Glasgow and Slater; and the last stretch 92 miles to Kansas City through Blackburn, Corder, Higginsville, Mayview, Odessa, Oak Grove, Grain Valley and Independence.

You travel west through Kansas and will be over the new Santa Fe trail as far as Newton, going 123 miles to Emporia through Martin City, Olathe, Edgerton, Ottawa, Williamsburg and Waverly, then 83 miles to Newton through Cottonwood Falls, Elmdale, Clements, Florence, Peabody.

The Meridian road is traversed 25 miles to Wichita and on through Oklahoma, although it is more generally known as the Chisholm trail in Oklahoma. The 187 miles to El Reno traverses a road through Wellington, South Haven, Caldwell, Renfrow, Medford, Pond Creek, Kremlin, Enid, Hennessey, Dover and Kingfisher, then the last run of 115 miles is via Pocassett, Chickasha, Verden, Anadarko, Apache and Rohrer.

A blue Book 5 will be found most useful, not only in supplying you with running directions the entire distance, but giving you the best hotels and garages to choose from, and city maps and road maps are plentifully interspersed.

Gorin, Mo.-Joplin, Mo.

Gorin, Mo.—Editor Motor Age—Please give me the best and shortest route from Gorin to Joplin, Mo., and then to Adair, Ia.—C. O. Dutro.

It will be best for you to make a connection somewhere along the line with the Hannibal and St. Joseph cross state highway, which runs through Monroe City, Shelbina, Macon, Kern, Bucklin, St. Catherine, Brookfield, Laclede, Meadville, Wheeling, Chillicothe, Utica, Moorsville, Breckenridge, Hamilton, Cameron, Plattsburg, then out of Plattsburg southwest 2 miles, where you strike the Interstate Trail which runs from Iowa into St. Joseph and Kansas City. It is marked straight south into Kansas City over the new bridge, hence it is not necessary to enumerate the towns through which it passes. Poles are all marked blue white and blue with the letters I. T. in the white. The 181 miles to Joplin passes through Peculiar, Harrisonville, Adrian, Butler, Rich Hill, Nevada, Sheldon, Lamar, Boston, Jasper and Carthage if desired.

You can return to Kansas City by a road through Kansas if you like by following through Galena, Chetopa, Parsons, Chanute, Humboldt, Iola, Colony, Garnett, Ottawa, Wellsville, Gardner and Olathe.

It is 222 miles to Omaha via Hiawatha, Kan., the itinerary being Leavenworth, Lowemont, Atchison, Lancaster, Huron, Everts, Hiawatha, Falls City, Verdon, Nebraska City, Wyoming, Plattsmouth, La Platte and Fort Crook.

Your final run is 88 miles from Council Bluffs through Weston, Underwood, Neola, Minden, Avoca, Walnut, Marne, Atlantic and Anita.

The greater part of this road is given with running directions in the Blue Book No. 5.

Carriere, Miss.-Columbia, S. C.

Carriere, Miss.—Editor Motor Age—I expect to drive from here to Columbia, S. C., or Augusta, whichever is the best way, and would like some information in regard to the roads. I have a good road from here to Gulfport, and a fair road to Meridian.—W. B. Harbewon.

You should arrive at Birmingham through Livingston, Eutaw, Tuscaloosa and Bessemer from Meridian and then to Atlanta you will find the best road takes you through Gate City, Trussville, St. Claire Springs, Asheville, Steele, Attalla, Gadsden, Center, Cave Springs, Cedartown, Cartersville, Acworth, Kennesaw and Marietta.

Between Atlanta and Augusta the distance is 171 miles and the towns Decatur, Ingleside, Stone Mountain, Redam, Lathonia, Covington, Social Circle, Rutledge, Madison, Greensboro—the worst roads being found between the two latter towns—Union Point, Crawfordville, Boonesville, Langley, Aiken, Batesburg, Leesville and Lexington route you to Columbia over a very hilly road, and crossing many bridges with a clay stretch about half way that is impassable after heavy rains.

Running directions can only be had from Cartesville, Ga., on and these will be found in the volume 3 Blue Book.

Demopolis, Ala.-St. Louis, Mo.

Demopolis, Ala.—Editor Motor Age—I would like to have the best route from Demopolis to St. Louis, Mo.—H. Simon.

You will find a fair road to Eutaw and Tuscaloosa, but from there to Bessemer and Birmingham, the southern coal and iron center, it is good.

Between Birmingham and Nashville the road lies through Village Springs, Oneonta,

Brooksville, Guntersville, using the ferry to cross the river to New Hope, then running on to Huntsville, Meridianville, Fayetteville, Shelbyville, and Murfreesboro, going past the Hermitage, Andrew Jackson's old home, on the way to Nashville.

Variable road conditions exist on the 361 miles to St. Louis. You start out from Nashville on macadam road then run through Whites Creek, Springfield, where a poor rough road is found running through Cedar Hills, Adams, Clarksville, then macadam again to Ringold and Hopkinsville, and a mixture of poor gravel or clay road through to Paducah, encountering three toll roads and a couple of ferries.

Ferrying into Illinois to Brookport, the balance of the routing is very rough in places and in wet weather it will be very bad. The towns are Metropolis, Grinnell, Jonesboro, Grand Tower, Murphysboro, Vergennes, Pinckneyville, Winkle, Swanwick, Marissa, New Athens, Belleville and Edgemont.

Through Pennsylvania Oil Fields

Punxsutawney, Pa.—Editor Motor Age—I would like the best route between Punxsutawney, Pa., and Cleveland, O., giving distance and stating the condition of the roads.—Subscriber.

Leaving your home town we suggest that you go to Luthersburg, Pa., passing through Big Run and Troutville. It may appear foolish to you to go to Luthersburg first, but in doing so you will have in the end a much better route, for at Luthersburg you turn northwest, heading for Oil City, thence to Youngstown to Cleveland.

From Luthersburg you pass through Rathmal, Reynoldsville, negotiating two steep hills before reaching Brookville, thence to Strattonville, Clairon, Shippensville, Sandy, Salina, Oil City, to Franklin. Leaving Franklin you go in a southwesterly course through Polk, Perrine, Jackson Center, Mercer to Sharon. The balance of the way to Youngstown, O., is over dirt road, with rough stretches in dry weather and bad in wet weather; the towns on this section are Sharon, Brookfield and Hubbard.

From Youngstown, O., to Cleveland you will find natural dirt roads with occasional stretches of sand and rough clay but as you near Cleveland, brick is encountered. After leaving Youngstown you will go through Girard, Niles, Southington, Parkman, Troy, Auburn Corners, Auburn Center, Chagrin Falls, from which point you have brick pavement into Cleveland. Total distance 322 miles. The Blue Book, volume 3, gives complete running directions.

Ft. Smith, Ark.-Louisville

Ft. Smith, Ark.—Editor Motor Age—I would like the best and shortest route from Ft. Smith to Louisville via Memphis and Little Rock. How many miles can I average per day in a Ford car? What are good stopping places at night? How many days ought it take me to make the trip? In going to Memphis is it best to go through Little Rock or is there a more direct routing? Is an Arkansas license good in Tennessee and Kenutcky? Where can I get a good map for the trip? I will leave Ft. Smith August 1.—F. F. Gibson.

It will be necessary to have a Blue Book 5 and Blue Book 3 in order to make this trip with running directions. We never advise motorists who start out on a tour for pleasure to follow the route across Arkansas. It is better by way of Kansas City.

In starting for Kansas City if you take the direct route to Fayetteville, which is 65 miles you will find about half of it bad going. The route directly into Oklahoma and then through Kansas will not give you any better conditions to Sallisaw than you will have to Fayetteville, and another thing it will be found longer. From Fayetteville through Johnson, Springdale, Lowel and Rogers, Bentonville, Hiawassa and Pineville to Neosho the road is of many kinds. Some macadam, some solid flint hills and some plain dirt—no bad grades or bad streams.

Crossing the river at Ft. Smith to Van Buren the road lies through the Boston mountains and Winslow to Fayetteville. Cars usually make Fayetteville at noon and Neosho that evening, being a distance of 146 miles, but a Ford will not be able to make more than 125 miles a day. However you will find good hotels and garages at Springdale, Rogers and Bentonville. Following through Diamond to Carthage you will have no trouble unless it is very wet in routing through Jasper, Boston, Lamar, Sheldon, Nevada, Rich Hill, Butler, Adrian, Harrisonville and Peculiar to Kansas City. Neosho to Kansas City is 185 miles, and Carthage, Lamar, Nevada and Pleasant Hill have good garages and hotels.

You will undoubtedly take three days to cross Missouri, the first day's run being to Marshall at 92 miles, passing through Independence, Blue Springs, Grain Valley, Oak Grove, Odessa, Mayview, Higginsville, Corder, Blackburn and Mt. Leonard. The next day cross the river from Slater to Glasgow by ferry and on through Armstrong, Yates, Higbee, Renick, Clarke to Mexico, 97 miles, then to St. Louis, the following morning running 124 miles through Martinsburg, Wellsville, Montgomery, New Florence, High Hill, Jonesburg, Warrenton, Wright City, Colterville, St. Charles and Wellston.

From St. Louis a routing for dry weather only takes you to Vincennes, 156 miles through Belleville, Lebanon, Carlyle, Salem, Xenia, Flora, Noble, Olney, Lawrenceville; and to Louisville through Wheatland, Washington, Loogootee, and because of the rough and hilly road beyond on the short-line road, it is best to go via Shoals Huron, Mitchell, Paoli, Hardingsburg, and a succession of toll gates to Galena, New Albany and Louisville.

Road Reports of Value to Tourists

Illinois

THE Illinois division of the transcontinental route is in very good condition, especially that part from Chicago to Malta. There are a few miles of road between Malta and Rochelle that are not in the best of condition, but motorists will find no trouble in going over it, and within a couple of months this will be a good hard road.

There is considerable discussion in DeKalb county about building a cement or brick road from the north line of the county to the south line, a distance of about 36 miles, and establishing a motor bus line from De Kalb to Sandwich to run on a regular train schedule. There does not seem to be much question about the financial success of the project, as there are no railroads running north and south through the county that touch any of the large towns south of De Kalb. Most of the people favor cement on account of the way the cement road that was built last fall between DeKalb and Sycamore stood the frost. Of course this proposed road all depends upon what the legislature will do with the good roads bill. If this bill, giving state aid to counties, becomes a law, the above mentioned road will be built.

Texas

Texas motorists will be overjoyed with the news that a good direct road into Colorado from Ft. Worth through Wichita Falls, Vernon, Quanah and Amarillo soon will be available. The panhandle division of the Colorado to the Gulf Highway Association has been formed to oversee the improvement of the stretch to Amarillo. O. L. Williams of Bowie is president and D. P. Talley, an earnest good roads worker in Wichita Falls is secretary.

There already has been some work done on this road. Motor Age is informed that the road between Tolbert and Chillicothe has recently been graded; the sand stretches between Vernon and Clarendon, which have always been a bugbear to motorists, have all been clayed, including the streets of the former town. The worst place now is the Red river crossing at Estelline, which is not bridged.

Massachusetts

Pittsfield to Greenfield—The route via Dalton is not advised at the present time, as beyond Dalton the state road is under construction and a detour is necessary of some 6 or 7 miles through the woods, which road is very bad in places, and in bad weather almost impassable, and from South Deerfield to Greenfield a portion of the state road is under construction but is passable. The road between North Adams and Greenfield over Hoosac mountain is fairly good at the present time.

Northampton to Springfield—This road is closed, under construction, and a detour via Easthampton is necessary.

Springfield to Worcester—This road is in good condition except that a short stretch in Warren is closed, around which there is an easy detour well posted.

Hartford to Pittsfield—At Farmington the road is closed and a detour over sandy rough road to Unionville is necessary. There is another detour before reaching Norfolk which requires caution in approaching. From Norfolk to Great Barrington the road is rather rough, and generally speakng, only fair.

New Hampshire

Milford—The town authorities have published a notice warning motorists to slow down to 8 miles per hour, sound horn and keep to the right at the intersection of Nashua and South streets, and announce that they will prosecute all motorists who do not drive carefully through that town.

Virginia

Following out the general program of good roads building in this section voters of Greene county adjoining the county in which Bristol is located, have voted $500,000 in good roads bonds and when the money has been spent in that county, another link in the Bristol to Memphis highway will have been completed.

Three districts of Scott county, Va., voted $165,000 in good roads bonds and when this money has been spent in that county another link in the Bristol to Lexington, Ky., highway will also be nearing completion as one district is still to vote on the proposition to complete it to the Lee county, Va., line.

The road from Bristol to Abingdon, Va., a distance of about 15 miles is gradually being built and by the end of the summer it is expected that this important link in the Bristol to Washington highway will be ready for use.

The good roads agitation which has been kept up by the Bristol, Va., board of trade during the past 2 or 3 years is now beginning to bear fruit, and Bristol in another 2 years will be the center of the greatest highway system in the entire south.

A sum total of nearly $6,000,000 already has been appropriated and made available through bond issues for good roads in the state of Virginia.

Story of Pneumatic Tires

Growth of an Industry Value of Whose Product Amounts to $150,000,000 Annually in United States

From the Bicycle to the Motor Car

Causes of Many Changes in Design, Problems Discussed and Engineering and Commercial Fallacies Exploded

By Paul W. Litchfield

Editor's Note—Paper read before the recent session of the Society of Automobile Engineers by P. W. Litchfield, factory manager of the Goodrich company

THE manufacture of pneumatic tires, an industry less than 25 years old, has grown until at the present time the value of its product in the United States alone amounts to about $150,000,000 annually.

It has been the practice of motor car and vehicle builders for many years to make as nearly as possible the entire vehicle, but while the pneumatic tire is a component part of every vehicle, no manufacturer of bicycles, motorcycles or motor cars has ever made successfully his own tires, and the number of tire manufacturers has always been relatively very small compared with the volume of the industry.

I do not intend in this paper to go into the story of the process of manufacture of a tire, but to confine it largely to the history of the pneumatic tire design, from the time of its invention in the early nineties to the present time.

History of Tires

If we go back to about the year 1890 and look at the means of transportation in vogue, we find that the hauling by self-propelled vehicles on land was confined to the railroads, two smooth parallel rails being carefully laid to form a perfect roadbed to protect the machinery of the locomotive sufficiently to make it a practical commercial proposition. The millions of ordinary roads throughout the country were used for hauling by means of domestic animals only.

At about this time the safety bicycle and rubber tire were developed. This brought to the attention of everyone the simplicity, speed and healthful exercise to be obtained by abandoning the horse and propelling the vehicle by man-power. While the horse could not call attention to the weaknesses of the vehicle which made his work harder and his progress slower, man, when he assumed the duties of the horse, began to analyze. Then began the study and development of the self-propelled vehicle industry of today. The development of the internal combustion motor and of the pneumatic tire to protect the delicate machinery from shock followed by various stages. Motor car engineers have been following largely the development of the machine, while the tire man has followed the development of the tire as a means of protecting the machine. While today the cost of rubber tire upkeep is one of the largest items of expense in the maintenance of a car, it must not be forgotten that it is the tire which is put where most of the abuse comes, which does for the car what the steel rail does for the locomotive and makes every road possible.

Effect of Bicycle

Let us go back to the man on the bicycle. He soon found out that the solid tire was satisfactory on a smooth road, but when it came to a rough road he could feel the bumps and had to slow down, as the impact of the tire against stones and uneven surfaces was more than he could stand with comfort and more than he could propel the bicycle against with his own power for any length of time. Naturally, his next idea was to get more cushion. This resulted in the introduction of the cushion bicycle tire, which was an all-rubber tire with a hole in the center to allow for more distortion in the rubber itself, the cross-section diameter of the tire being increased from ¾ inch to about 1½ inches. The rider then found he had gained more cushion, but had increased the weight of his vehicle, so that it required more power to propel the bicycle on good roads. It was at this time that the pneumatic tire was invented to increase the cushion, decrease the weight and lessen the power consumption of the tire on ordinary roads. Since about 1893 the only tires which have been used on self-propelled vehicles are either solid rubber or pneumatic rubber tires; no other type seems at the present time likely to engage the serious attention of engineers.

As both of the above-named types are being used in larger quantities every day, let us analyze the difference between them and see under what conditions one seems to be superior to the other. This brings us to the question: In a self-propelled vehicle, what are the functions of the tire? They are, first, and foremost, a cushion to protect all parts of the vehicle from the shock caused by the impact against inequalities of the road; second, to provide proper traction, avoiding unnecessary slip. These are the two main functions, and, therefore, the principal thing to be kept in mind in tire design is to accomplish them satisfactorily at as low a cost per vehicle mile as possible, with the least possible consumption of power, and with the least amount of trouble and inconvenience to the driver and occupants. The pneumatic tire depends upon the elasticity or resiliency of a gas, i. e., air, for its cushioning effect, while the solid tire depends upon the resiliency of a practically incompressible solid, i. e., vulcanized rubber. It is needless to say that air is the more perfect cushion and the lighter and cheaper, the cost lying only in the air container. No other solid body can compete with india rubber in acting as a cushion by being greatly distorted and recovering its original shape again repeatedly with very little fatigue.

A Popular Fallacy

One point regarding rubber must be borne carefully in mind, which is, that vulcanized rubber is practically incompressible; its cushioning effect is only possible by distortion and recovery, and it must be allowed by the designer plenty of room for this action. A glance at hundreds of patents on solid-rubber tires shows that

PORTION OF ORIGINAL TIRE AND WHEEL INVENTED BY THOMPSON IN 1846

One of the first two non-slipping covers designed by J. B. Dunlop

this point has been ignored by inventors almost entirely. Another point frequently overlooked is that the shock may come from almost any direction, owing to varying road surfaces, turning corners, running into curbstones, etc. Many tires and spring wheels carefully designed to take up blows acting directly from the ground vertically towards the rim are utterly unfit to withstand shocks in other directions.

Before selecting between the solid and pneumatic tire, the weight to be carried, the speed to be attained, and the character of the road must be considered. The load to be carried can be worked out satisfactorily on either type. In a solid tire it requires a sufficient amount of properly compounded rubber, and in a pneumatic a sufficient combination of air volume and pressure contained in a suitable retainer. The character of the road and the speed have a great deal to do with the selection of type, as air being a much better cushion than rubber, allows the pneumatic to give much more efficient cushion and traction on rough roads and at higher speeds than is possible for the solid. As far as the efficiency of the vehicle is concerned, the pneumatic would nearly always be chosen as the ideal tire were it not for the fact that in many cases the roads are sufficiently good and the necessary speed sufficiently slow to make the saving in cost per mile on solid tires, due to their longer life, offset the increased efficiency of the pneumatic.

Again, the unreliability of the pneumatic due to injury through punctures or blowouts, making attention to it necessary at awkward places and times, often causes the selection of solid tires, as frequently occurs on pleasure electrics for ladies, fire apparatus, mail wagons, etc. In short, good roads and slow speeds are favorable conditions for solid tires; ordinary roads and high speeds for pneumatic tires. The solid tire having less cushion and less motion requires a lower percentage of pure rubber in its composition than the pneumatic, which tends to lower tire mileage cost.

Rubber Supply

A lowering of the price of crude rubber will tend to popularize the pneumatic tire, and it is well to bear this point in mind, as the average price of crude rubber will probably be lower each year until it reaches less than one-half its present market price. The selling price of crude rubber in the past has been fixed by supply and demand and speculation, with no reference to its cost of production, but its cultivation on a large scale is changing this condition, and it is probable that in five or six years there will be a sufficient amount of rubber to supply the demand at a cost of less than 40 cents per pound, which alone should save 33⅓ per cent in the cost of pneumatic tires. The danger of the rubber supply running out, which was very serious three years ago, causing rubber to advance to $3 a pound, caused successful cultivation to become an accomplished fact, which apparently solves the question of our future supply. It is hoped that the present scarcity and high price of gasoline will in a similar manner be the means of solving the question of the future motor fuel supply.

Three Types of Pneumatics

To go back again to the man on the bicycle. His experience with solid and cushion tires resulted in the invention of three types of pneumatic tires at almost the same time, and these three have been the only ones that have been, or are now, used in any quantities. They are the single tube, invented by Tillinghast; the clincher, invented by Bartlett, and the wired-on, invented by Dunlop. There was great rivalry between the three types for 2 or 3 years, resulting in the supremacy of the single-tube in the United States and the clincher and wired-on types in all other parts of the world. The introduction of quick-repair cements, of single-tube repair shops all over the country, and lower cost of production were largely responsible for the success of the single-tube in this country. The wired-on type is still the most popular in other countries.

Carriage and Motor Car Tires

Following the pneumatic bicycle tire came the pneumatic carriage tire, and each country developed the type of tire found most popular on bicycles. This was temporary business, however, because the tires were used on horse-drawn vehicles, they did not have to perform the traction or driving functions, and the speed of the horse was so slow that a sufficient amount of cushion could be obtained from solid tires and metal springs without the annoyance of punctures; hence this type of tire gradually gave way to the solid.

Following the pneumatic-tired carriage, about the year 1898, came the motor car with its delicate mechanism and high speed, and with it the demand for a more durable and efficient pneumatic tire. As in the case of the carriage, each country still further developed the type of tire which was most popular and successful on bicycles. American designers went ahead with the single-tube, making it up to 5 inches in size, while England developed the wired-on, and France the clincher—the clincher was also being made by G. & J. and Goodrich in the United States. It did not take very long, however, to discover that conditions were quite different on the motor car from what they were on the bicycle, and the French clincher tire made by Michelin and others soon had all the other types on the run, and English and American tires were at a discount. The wired-on type, which proved so successful on English bicycles, disappeared in the large sizes, because the one-piece Dunlop rim, which was so easy to fit with an inextensible-edge tire in small cross-sections, was almost an impossibility in large sizes. The single-tube American tire when made of a size and thickness necessary for an automobile could be repaired only at great expense and at a well-equipped repair shop. Roadside repairs were impossible. The clincher-type soft-bead tire was the only practical one of the three for a motor car, and soon became the standard of the world and was made in all countries. The weaknesses of this type of tire which developed were principally the difficulty of forcing the tire—in the large sizes—over the one-piece clincher rim; the necessity for several tire bolts to keep it from creeping on the rim, owing to the stretching of the bead; its depending entirely upon air pressure to hold it on properly; and when overloaded, or much underinflated, rim-cutting, and if run wholly deflated, destruction in a very short time. To overcome these difficulties several mechanically fastened side-flange and bolted-on type tires were introduced, but they required special wheels, special widths and diameters of felloe, were more expensive, and, with the exception of the Fisk bolted-on type, did not make much headway against the standardized clincher tire.

Standardization of Clinchers

The Clincher Automobile Tire Manufacturers' Association had wisely standardized the clincher rim dimensions and insisted on carefully inspecting all rims manufactured, saving to the motor car owners and tire manufacturers hundreds of thousands of dollars, which would nave been lost if the unstandardized condition, similar to that which now exists in Europe, had not been remedied.

During 5 years, from 1900 to 1905, the clincher tire was perfected and standardized. It seemed that it would have no competitor, but the last-named year brought out the invention of two quick-detachable rims, the Dunlop and the Goodyear. They were developed to a point that they would fit the same wheels as the clincher rim, and by reversible rings, take either the clincher type of tire or the wire-bead type. These rims overcame first the difficulty of stretching the tire over the clincher rim, which was so difficult in large sizes; second, with the removable side ring the tire could be made with an inextensible bead, making it free from creeping by the use of only one bolt on the valve stem, instead of several at intervals around the tire; third, the beads being always against the rim, the inner tube was not as liable to be ruined, in case of puncture, by getting under the beads, and, fourth, a wired-on type could be used with the flanges turned outward, instead of hooked on, making rim injury to the tire less likely in case of overloading and underinflation. The flared-out side ring also made it easier to mount and remove the tire from the rim. This quick-detachable type of rim became, a year or 2 later, the American standard and the wire-bead type of tire began to grow steadily in popularity.

The introduction of this wire-bead straight-side tire met with considerable opposition from the manufacturers of clincher tires, and in

Template for first detachable tire designed by J. B. Dunlop

meeting it they introduced the quick-detachable-clincher type. This was a combination of the inextensible wire-bead and the clincher hook. This tire overcame the disadvantage of forcing the tire over the rim, and the pinching of the inner tube when deflated, but possessed no advantage over the straight-bead type, and had the disadvantage of having an extra amount of unnecessary material in the beads; a smaller air volume in the tire; being more difficult to apply and remove from the rim; the addition of the hook bead performing no useful function whatever, except that of a filler to enable its use upon a clincher rim. It would seem inevitable that this type of tire will soon give way to the straight-side type. This narrows down the principal types of pneumatic motor car tires to two forms—the soft-bead clincher tires—to fit the one-piece rims—and the wire-bead straight-side tires—to fit the quick detachable rims. This brings the historical development of the pneumatic tire down to the present time.

Vulcanization In Tires

Now I would like to discuss some of the differences between the principal pneumatic tires now in the market. Let us first take up the subject of vulcanization. Vulcanization is the chemical change which is caused by the action of heat and time upon the mixture of rubber and its chemical compounding ingredients, transforming it from a plastic dough to a resilient and reacting solid. In order to get a properly vulcanized tire extreme care must be used as to the materials used in compounding, in regard to both quality and amount, and also as to time, temperature and conditions under which the vulcanization takes place. A tire revolving constantly along the road, carrying the weight of the car, and each moment changing its shape and recovering, generates a great deal of heat. This action of heat carried on for a considerable time has a tendency toward affecting the vulcanization. Therefore, all high-grade guaranteed tires are usually compounded so that they take a very long time to vulcanize. This increases the cost of manufacture.

Many unguaranteed tires are so compounded that they vulcanize quickly, saving from one-half to three-quarters of this time, in order to cut down the cost, but the heat generated along the road tends to overvulcanize these tires and they are apt to separate and blow out after a much shorter mileage on this account.

The three methods of vulcanizing now in use among the tire manufacturers are popularly known as, first, the one-cure wrapped tread, as examples of which may be mentioned the Fisk, Empire, Ajax and the G. & J.; second, the unit molded type, examples of which are the Republic, Goodrich, Michelin and Diamond; third, the two-cure wrapped tread, examples of which are the Firestone, Morgan & Wright and the Goodyear. Michelin and Diamond tires were formerly made by the third process, but recently have been made by the second.

In the one-cure wrapped tread process the tire is completely built over an iron core, wrapped with fabric and put into an open steam boiler and vulcanized in one heat.

In the unit molded process the tire is completely built upon an iron core, then put in an iron mold and vulcanized under hydraulic pressure in a press or open steam vulcanizer.

In the two-cure wrapped tread process the carcass of the tire is built over an iron core and vulcanized in a mold the same as in the unit molded type, but not entirely cured. It is then removed from the mold, buffed and cemented and the tread rubber applied and given a second vulcanization.

With the Morgan & Wright and Firestone tires this second vulcanization is done while the tire still remains on the core, while in the

Goodyear process the tire is inflated by means of an air bag on the rim; in either case after the tire has been cross-wrapped the second cure takes place in an open steam vulcanizer.

Each of these three methods of vulcanization has its enthusiastic supporters. Those who use the first two methods claim that they obtain a more perfect vulcanization. They are undoubtedly cheaper in first cost. Those manufacturers using the two-cure process believe that the vulcanization is more uniform throughout the tire and that there is sufficient increase in quality and durability of the tire produced to warrant the extra initial cost for it.

Fabric Used in Tires

Another difference in pneumatic tires is in the style of fabric used, there being two distinct types upon the market, the close-woven fabric tire and the cord tire. Nearly all tires are of the close-woven fabric type as they are more durable, easier to repair in case of injury, and can be operated at a much lower cost per mile. In driving a car considerable power is consumed by the flexing of the pneumatic tires, and it has been found that this loss can be reduced largely by using parallel cords instead of woven fabric, as much as 25 per cent of the power sometimes being saved. The cord construction also permits greater speed and makes an easier riding tire than the square woven type. It is, however, a much more difficult tire to repair and in practice does not work out at as economical a cost per mile as the close-woven type. Its power-saving factor makes it desirable on electric vehicles, where the radius of action is limited by the capacity of the storage battery used. In a fuel economy test with a gasoline car the mileage in many cases could be increased from 15 per cent to 20 per cent by substituting cord tires for the square woven-fabric tires.

Size Is Important

The next point to consider is the size of the tire. In the pneumatic tire the load is carried by an air cushion, and the amount of the load carried depends upon the combination of the volume and pressure of air used. For a given weight of car it follows, therefore, that the larger the volume of air in the tires the less inflation pressure required, while the smaller the tire the greater the inflation pressure necessary to carry the load. Tires should be large enough to carry the load with very little flattening of the tire, say not over 14 per cent of the sectional diameter at an inflation pressure which will give sufficient cushion to the vehicle. For instance, a car may be equipped with 32 by 3½-inch tires and be of such a weight that it requires 90 pounds pressure in them to properly carry the load and avoid such excessive flexing of the tire walls as to cause rapid breaking down of the casing. This pressure would make the tire so rigid that the tendency would be to reduce the air pressure in order to get sufficient cushion, which would cause the tire to give short mileage. While, if a 33 by 4-inch tire were used on this car, the air volume would be enough larger to permit the successful use of a lower air pressure, increasing both the cushion and the durability of the casing.

The inflation pressure which you see embossed on the casings are the pressures which the tire manufacturers recommend as necessary when carrying the maximum load for which the tire is guaranteed. There is always a certain amount of leaking of the air through either the pores of the rubber or through the valve connections, which causes the inflation pressure in the tire to be reduced greatly. It is the case frequently that a 32 by 3½-inch tire will start out with 70 pounds air pressure and not be reinflated until the pressure is down to less than half this amount. Needless to say, the volume of air being constant, the ability of the tire to properly carry the load is reduced constantly as the pressure decreases. This shows the necessity of frequently testing the pressure with a gage and keeping the tire up to the required pressure. Whatever effort the tire manufacturer makes to put mileage into a tire is of no value unless the air pressure is maintained by the user. The extra power consumed by the use of the larger tire is so small as to be a negligible quantity in present-day cars. It is also to be noted that the larger the cross-section of the casing, the greater the amount of tire wall which comes into action, which reduces the fatigue of the rubber and fabric and lengthens the mileage which the casing will give.

Opposes Tire Fillers

The use of tire fillers is another question which has commanded the attention of motorists, owing to the extensive advertising carried on by the tire filler companies during the past year. A pneumatic tire casing is designed for use with compressed air; when it receives a blow or shock from an obstruction in the road, the blow is distributed all over the casing, owing to the support of the perfectly fluid air-cushion behind it, the tire absorbing the blow, turning it aside, with very little injury to the casing, except in very severe instances. When a filler is used, the blow is localized in the immediate proximity of the point at which

J. B. Dunlop's son riding the original pneumatic tires on his safety bicycle in 1888. Front tire now is in Royal Museum at Edinburgh

it is received and the strain falls in one place, thereby weakening the tire. Constant repetition of these blows causes the casing to gradually disintegrate and wear out.

The fillers add considerably to the weight of the car, require a great deal more power to drive the car, and do not absorb the shocks to nearly the same extent as is the case of air. Air retains its resiliency and is as perfect after being in use a year as when put originally into the tire, whereas the original maximum resiliency of a tire filler decreases gradually. The detrimental effect of the fillers was shown by the withdrawal of the tire guarantees as well as car guarantees by nearly all the principal manufacturers when tire fillers are used.

Another disadvantage of the filler is that as the casing stretches, the filler, being a solid body, does not follow up the casing with a constant pressure, whereas air, being a gas, maintains its pressure continually, regardless of the flexing and stretching of the casing. The casing cannot carry the load for any considerable period without the required pressure in the case of a tire filler any more than it can with air. Substitutes for air other than solids have been used, especially different forms of gas.

The use of these various gases as proper means of inflation has been questioned by the tire manufacturers, not because they are chemically injurious to the rubber, but because they filter through the walls of the inner tube much more rapidly than air, consequently reducing the inflation pressure. Carbonic acid gas at usual riding temperature will leak through the walls of the inner tube many times faster than air. It has even been demonstrated that with air, the oxygen seeps out much faster than the nitrogen. The disadvantage of the carbonic-acid-gas-inflated tire is that the user does not realize how fast the pressure is reduced and does not restore it quickly enough. When sufficient care is used, and the inflation pressure is frequently tested, there is no reason why carbonic acid gas should not be as satisfactory as air.

Rims That Are Best

Before closing I would like to touch upon the subject of rims for pneumatic tires, as it is of the greatest importance to the tire that it be fixed upon a properly designed rim. With clincher tires especially the exact contour of the hooks is of great importance, as it takes only a very little variation from the standard to completely ruin the tire. The proper design for the width between clinches on a clincher tire has been standardized at 60 per cent of the nominal cross-section of the tire. It is the writer's opinion that the proper dimension for the width at the heel of the bead for the straight-side wired-on tire is 66⅔ per cent of the nominal cross-section of the tire, flaring outward from the heel of the bead. The less the required flexing of the casing when the tire is overloaded or insufficiently inflated, and the larger the supporting surface given by the rim to the tire where the flexing occurs, the less the tendency toward rim-cutting. The ideal rim would give continuous support to the tire, especially where the tire leaves the rim on the sides. Split and open side rims should be avoided as far as possible. When split rims are used, it is also absolutely necessary that they be in perfect alignment.

Discussion on Tire Paper

The discussion on Mr. Litchfield's paper was opened by J. B. Dunlop, Dublin, Ireland, the veteran inventor of the pneumatic tire, now in his 74th year and one of the party of British engineers visiting in this country. Mr. Dunlop said:

"I esteem it a great privilege to say a few words regarding the invention of the pneumatic tire. There have been a great many mis-statements made regarding the invention but as we say in Ireland 'one-half the lies going around are not true.' I always realized the importance of traction when moving about on roads and water and gave particular attention to it in my inventions relating to boats. Then I turned to the reduction of traction on roads. First I thought of flexing steel and tried a flexible steel wheel for a test of 50 miles but it proved a failure.

"My chief thought in the reduction of friction in a vehicle for the road was along the line of the tire flattening out, giving a greater area in contact with the road and so reducing the pressure per square inch of surface. I am surprised that I was so long thinking about the pneumatic tire. When I was 5 years old, a man in Edinburgh made a pneumatic tire and had it on the road but it was impractical. It was forgotten until 2 or 3 years after my invention and when my tires were running on the roads.

Solids vs. Pneumatics

"Everyone knows that the speed of a pneumatic tire is due to its resiliency yet the poorest pneumatic tire ever built was the one with the greatest resilience. The perfect pneumatic tire must be rigid circumferentially and laterally but elastic and resilient in a radial direction, that is in the direction of the wheel hub. Besides resilience there is one other thing: If you take a solid rubber tire 1 inch in diameter and stand on it you flatten it out and the center remains where it was before you started and the sides creep out, so that when you get off it the sides move in again. This is exactly what happens in a solid rubber tire on a wheel and the worst of it is that this flattening out causes heat. With the solid rubber tire there is always a lump ahead of the part of the tire resting on the road so that with such a tire you are always going up hill.

"This is not so with the pneumatic tire as it is made of an elastic substance. Let me explain: Measure 1 inch circumferentially on the surface of a pneumatic tire. No matter whether the car weight is resting on this 1 inch or not; the measurement remains the same, namely 1 inch, whereas, with a solid rubber tire a similar inch measured flattens out. When the pneumatic tire touches the ground it does not flatten out circumferentially and because of this it is faster than any other type of tire that does.

"There is a great loss from traction in the solid rubber tire, even though they were made 1 inch in diameter. When I made my first pneumatic tire I made it of large diameter. They all said that I would fail but I wanted the large diameter in order to reduce the pressure per unit of area.

"Regarding my first pneumatic tire: I made it and put it on a bicycle November

1, 1888, in Belfast, Ireland. I made the air tube from sheets of rubber which I cut into strips and cemented the strips together, using the nipple from a nursing bottle for a valve stem. It was inflated with my son's football pump. The tube held air perfectly. I used a good grade of rubber. The casing into which I put the tube was made from heavy linen cut from an old dress. I cut the cloth straight and made it 4 inches shorter circumferentially than what was needed in order to have it very tense. Other people later tried by cutting the cloth on the bias but it was found that the threads cut one another when used this way. The wheel was a wooden disk and after sewing the air tube into the casing I nailed the tire to the disk.

"The evening after I completed the job two or three men were in the yard at my home and I brought out the disk with pneumatic tire and also a wheel with a solid rubber tire. I asked them which would be the faster and they all agreed that the solid would be. 'Let us try,' said I. I rolled the pneumatic across the yard and it struck the wall at the other side. I then tried the solid tire but it did not roll across the yard. They said that I put more force into the pneumatic, then I let each of them try. They all agreed with me and one asserted that the further the pneumatic went the faster it went.

First Pneumatic on Bicycle

"The next effort was to get a pneumatic tire on my son's bicycle. I took the solid tires off and put on the pneumatics. These first tires were ridden on the streets every day, all that winter and until July, 1889. We did not have a puncture on the front wheel and only one on the rear wheel. This puncture was had about Christmas, 1888, when I loaned the wheel to an expert rider to test and sent him over one of the roughest roads we could find. After the puncture it took me only a few minutes to make a satisfactory repair.

"These tires had an air tube which was made from a length of tubing with the ends vulcanized together. The casing was made from a good grade of linen and made in the form of a tube with flaps extending around the rim or felloe and were cemented thereto. It was impossible at the first to get air tubes in the sense they are understood today in a pneumatic tire, the rubber makers ridiculing the idea of the tire so made. The tubes finally obtained were made from 1/32-inch stock the same as used at present.

"With tires so made the bicycle was ridden 3,000 miles over the worst roads and during all the bad weather of the winter of 1888-1889. This bicycle had the rear wheel slightly larger than the front one, the latter being now, with tire, in the royal museum at Edinburgh, Scotland. It was 28 by 2 inches in size and showed little signs of wear when delivered to the Scottish museum.

"The idea of selling pneumatic tires to the trade was conceived about Christmas 1888 when patterns were designed for making them, these being made of malleable iron in Glasgow and it was in March 1889 that the first bicycles were sold fitted with pneumatics.

"The first purchaser of a pneumatic-tired wheel was W. Hume, captain of the Cruisers' club of Belfast. Three or 4 days after he purchased the machine he decided not to take it at once but later, preferring to wait until April when there were to be some races in which he wished to compete. He was desirous of keeping it a dark horse until the race day arrived, being aware of the extra speed possible with the new tires. The bicycle agent soon convinced him that he was going to sell others and that if he, Hume, wanted a racing machine he would get such a one ready for him in time for the races. This was agreed upon and when the date of the races arrived Hume was ready with his special racer and its pneumatics.

"This memorable race, being the first in which a pneumatic-tired vehicle competed, occurred in May 1889 in Belfast, the occasion being the sports at Queens College. Hume won first in all races and his victories created a sensation. In the first race a 60-yard handicap for 1 mile, Arthur DuCrou was on scratch with Hume a few yards handicap. In this race Hume used a safety, the first one ever seen in a race. It had a 1½-inch pneumatic and when it appeared on the track everyone cried, 'See the wee bicycle.' The track was four laps to the mile and during the first lap the crowd cried, 'See the wee bicycle is going as fast as the big ones.' At that time many people did not understand the idea of gearing up in safeties and they could not understand why the machine went so fast with the rider working the pedals so slowly. In the third lap the 'wee machine' came up to the front and finished the last lap more than 100 yards ahead of all the others. A bookmaker, who had been offering long odds on the 'wee machine,' shouted when he saw it leading, 'There is a demon in that machine.'

Opened Professors' Eyes

"Immediately after the race all of the professors in Queens College went into the center of the track to examine the machine. I was sitting in the grand stand and was asked to go in and explain it, and when the announcement that it was my invention was made there was much cheering, it being a surprise that a veterinary surgeon and blacksmith should invent such a wonderful affair. Several of Hume's friends backed him in the race, the odds being 10 to 1, some posting $100 on the race. In the remaining three races of the day the pneumatic-tired bicycle won easily.

"The first factory for the manufacture of pneumatic tires was in a small room in a three-story house in Belfast where I taught the men to make the casings. They continued making them for a few months until July 1, 1889, when they became discouraged owing to the difficulty of getting air tubes that would hold the air under inflation pressure. When well inflated at night the pressure would be gone the following morning.

"To get good tubes was difficult, but the first ones were obtained from Silvertown, one of the large rubber makers, who furnished two tubes that held the air perfectly at any pressure. Owing to a strike in the factory it was impossible to get more tubes and others had to be obtained from Bates of Leicester, England.

PIERCE-ARROW ELECTRIFIES

Electrification of the new Pierce-Arrow cars has been extended to include the means of communication between driver and passengers in all closed types of bodies. This takes the place of the conventional speaking tube and is really a motor car telephone. The new equipment is called the chau-phone and is a product of the Western Electric Co. Current for operating the instrument is taken from the regular storage battery.

J. B. Dunlop's home, where the first pneumatic tire was made

Among the most notable changes in Pierce-Arrow models this year is the change in the method of cranking the engine. The air cranker which has been the stock equipment on this car is superseded by an electric cranking and lighting system designed by the Pierce-Arrow engineers and built by the Westinghouse Co. The maker of the car is loath to give up air as a cranking medium, as the company still believes the system just as efficient as electricity, but the change has been made to comply with the public demand. In connection with this change the headlights have been altered as to their location and are now placed within the front mudguards.

REPUBLIC TRUCK IN DETROIT

Detroit, Mich., June 17.—Detroit is to be headquarters for another great motor truck manufacturing company, whose trucks will be built elsewhere but will be marketed entirely from the Detroit headquarters. The Alma Motor Truck Co. has just been formed to take over the commercial car manufacturing business of the Alma Mfg. Co., of Alma, Michigan. W. M. Hogle, who was for many years with the Alden-Sampson Mfg. Co., and later with the Sheldon Axle Co., has received the appointment of sales manager for the new company and will locate his offices in Detroit. The new truck will be known as the Republic, and will be manufactured in but one model, which will have a rating of 1,500 pounds capacity. This truck will list at $1,425 when provided with either stake or express body. In the manufacture of this truck, the company assembles the parts made by many well known manufacturers. A continental motor 3¾ by 5¼ and rated at 28 horse power is used. The motor is controlled by a governor. The Alma truck was the predecessor of the Hercules which was marketed by the Flanders Motor Co.

STRIKE IN STUDEBAKER PLANTS

Detroit, Mich., June 18—Demanding a weekly pay day instead of a semi-monthly one, 3,000 employes in the local Studebaker plants struck yesterday. The company says the weekly pay is under consideration and that the real reason for the strike was the discharge of an employe a few days ago. There has been no violence. The strikers claim that the employes in the other motor car factories in Detroit will act in sympathy with them.

The strikers claim that about 6,000 men have left their jobs, although the concern states that it is operating satisfactorily and not more than half that many are out. There are about 8,000 men employed by the corporation normally. An 8-hour day instead of a 10-hour one is one of the demands of the discontented ones.

MERITS OF DIFFERENT SPRINGS

Weight Distribution a Factor in Design of Suspension

TACOMA, Wash.—Editor Motor Age—Please give the relative merits and demerits of the different forms of springs as used on motor cars—semi-elliptic, three-quarter elliptic and elliptic, both for front and rear. It has seemed to me that the easiest riding cars I have been in are those having elliptic for both front and rear. Our city is one succession of hills so that a motorist is shifting gears very often.

2—After having used a car for 3½ years, I have found much more satisfaction in having a car geared at 4 to 1 on direct rather than 3½ to 1. If the grade is long and the car can barely make it on direct, the whole car often vibrates which, if it occurs often, must be injurious. If the car takes the grade easily there is no noticeable vibration. Since my use of the car is 98 per cent of the mileage within the city and my speed never greater than 35 miles per hour, can there be any objection, aside from a slightly increased consumption of gasoline and certain per cent more of engine revolutions, to changing the gear ratio from 3½ to 4 in the average car?—B. H. Foreman.

Your question is rather broad. The advantages and disadvantages of the various types of springs depends upon weight distribution and the design of the car. One form of semi-elliptic spring may be superior to a certain form of elliptic or three-quarter elliptic, and vice-versa. The spring problem is solved best if examples are given. That is, take three cars of given weight distribution and design and then the matter may be threshed out.

Spring suspension has been a great problem to motor car engineers, because the car of necessity must travel over rough roads and at slow and high speeds. If the object of the springs is understood clearly the relative advantages and disadvantages of the various forms will be understood more readily. Springs must support certain members of the car, they must absorb the shock transmitted by the road wheels. Springs to be efficient must prevent the body of the car from side swaying. In other words, the springs of a motor car must be strong to support a load and resilient to make riding easy.

The semi-elliptic spring is used in the majority of vehicles, in the front and in many also in the rear. This type reduces side sway greatly and yet is not hindered in its movement. This type is adapted to carry great weight without the tendency to permit side sway. If semi-elliptic springs are made to be exceptionally resilient they must be made long. This adds to the cost and at the same time increases the tendency to side sway.

Stiff semi-elliptic springs are not to be desired when shock absorbing qualities are factors, for when a car with such springs strikes an obstruction on the road the tendency is for the wheels and axles and perhaps a portion of the car to leave the ground.

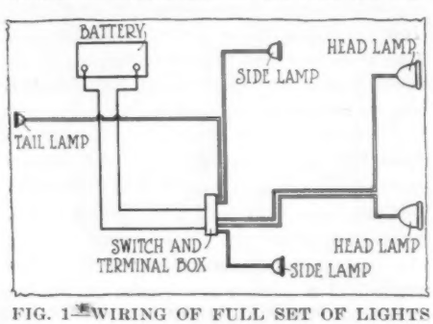


FIG. 1—WIRING OF FULL SET OF LIGHTS

The Readers

Questions Answered and Communications

B. H. Foreman	Tacoma, Wash.
Charles S. Barry	Hot Springs, Ark.
J. E. Mosebel	Washburn, Ill.
P. C. Liederbach	Buffalo, Minn.
Horace H. Kelly	Oceanside, Cal.
Student	Boston, Mass.
J. P. O'Shaugnessy	Gazelle, Cal.
H. A. Cook	Flint, Mich.
Charles Mousel	Wilsonville, Neb.
A Reader	Greenville, Miss.
Ewing McLean	Greencastle, Ind.
A. Neumann	Marshfield, Wis.
C. D. Enfield	Jefferson, Ia.
Albert Straus	Hamilton, O.
C. F. Maier	Alburnett, Ia.
Tuck	Memphis, Tenn.
A. D. Carpenter	Sauk Center Minn.
Serens Wellman	Horton, Mich.
B. M. Hyde	Columbus, O.

GAS PRODUCERS FOR MOTOR CARS

Reader Suggests Pintsch System—Exhaust Heated Coils for Kerosene

Hot Springs, Ark.—Editor Motor Age—Has any motor been built or any conclusive experiments conducted to prove or disapprove the economy and practicability of any method of carbureting or vaporizing kerosene by subjecting it to the heat of the motor's exhaust?

2—Could not the same method of producing hydrocarbon gas be used on an internal combustion motor, as is in daily use by the Pintsch system, for making railroad car lighting gas, using the exhaust manifold instead of a coal furnace such as they employ?

3—Is there any exhaust heated coil or retort on the market at the present time doing this work satisfactorily?

4—Would like a review of the work that has been done in this field, as it ought to be interesting in view of the rising price of gasoline.—Charles S. Barry.

1—Yes; a number of kerosene motors and carbureters have been tested and reported in Motor Age. The latest appeared April 25.

2—Possibly this might be worked out.

3—Yes; made by the G. C. Vaporizer Co. of America, New York.

4—Such a review is in preparation.

LONG AND SHORT-STROKE MOTORS

Crankshaft Speed and Displacement Factors in Power Developed

Washburn, Ill.—Editor Motor Age—Can Motor Age tell me whether a square cylinder 4¼ by 4¼ inches has as much power as a long-stroke 4¼ by 7 inches. Please give the reason in detail as much discussion has arisen on this point. Will the larger stroke give more pulling power, that is, not taking into consideration the A. L. A. M. rating, as I know how it rates a car.—J. E. Mosebel.

It is possible that the square motor has greater power than the long-stroke motor on account of better design, but granting that both motors are alike in every respect other than stroke, at the same crankshaft speed the long-stroke motor will have more power. The best way to look at the power question is to consider displacement and crankshaft speed. If one motor has a greater displacement than another it is evident that at the same crankshaft speed it will have more power than the one with little displacement. So with the motors of which you speak. If the square motor has a very high crankshaft speed it may develop more power than the long-stroke motor.

By the modified S. A. E. formula, which considers stroke and crankshaft speed as well as the bore, a four-cylinder motor of 4¼ inches bore and stroke would have 28.9 horsepower at 1,400 revolutions per minute. The 4¼ by 7-inch motor would have 47.0 horsepower at the same crankshaft speed. Both are rated at 28.9 horsepower by the S. A. E. or old A. L. A. M. formula.

GROUND SHOULD BE COVERED?

Direction of Current Flow Has No Bearing on Location of Insulation

Buffalo, Minn.—Editor Motor Age—A magneto generates alternating current, like the Splitdorf, for instance. When the switch is turned on the battery side the current flows from the positive side of the battery through the magneto breaker-box, thence back to the negative side of the battery, making a direct current. This being the case of course the secondary current is too direct. The negative end of the high-tension wire is grounded to a primary and the positive is led to the center of the distributor where it is sent to the plugs in proper sequence. So far, we have been dealing with direct current.

Now, when the switch is turned to the magneto side we are using alternating current of a frequency of possibly 100 to 3,000 cycles. If the primary is alternating the secondary must also be. This being so the current travels one-half cycle from the high-tension terminal of the coil along the high-tension lead to the distributor then to the insulated electrodes of the plugs in the proper firing sequence, thence across the gap to the shell of the plug and to ground, and it travels back to the transformer coil via a primary wire. Now on the other half cycle the current must travel in the reverse direction, that is the high-tension flux travels down the primary to ground thence to the shell of the plugs, then jumps the gap and returns via the distributor to the coil over the high-tension cable route.

Now, assuming this to be true so far, why is it not necessary to use high-tension cable from the secondary coil to ground as well as it is to use it from the secondary coil to the distributor. In other words, if the primary cable will suffice on one end of the secondary coil, why will it not on the other.—P. C. Liederbach.

The maximum voltage between the high-tension wire and the ground dictates the total amount of insulation between them.

Clearing House

If it were possible to do so, it would be just as effective to insulate the ground, that is, motor, frame, etc., completely and leave the high-tension wire bare. It is cheaper and safer from a personal standpoint to put all the insulation on the high-tension wire.

Take two sides of a circuit lying side by side, so far as leakage between them is concerned, same insulation is obtained if the insulating material is placed on either one and the other left bare or if it is equally divided between them. Further, the direction of current flow has no effect. The voltage is the determining factor.

WILL NOT START ON COMPRESSION

Many Reasons Given for Button Starting Not Being Effective

Oceanside, Cal.—Editor Motor Age—I wish to know if Motor Age intends to print any posters of the winners of the 500-mile race. I would like to get one if they do.

2—I have a Buick 30 touring car, and since I have had it it has seldom started on the button. When it is cleaned up and when it was new it was no better. Please tell me what is the matter with it.

3—I also wish to know the size of the motor and what is the lighting and starting system of the new Buick six, which I hear is underway of building.—Horace H. Kelly.

1—No.

2—One of a number of things would prevent the motor from starting on the button. First, if the button does not make contact as you press it in; second, poor compression; third, a poor mixture for initial firing; fourth, leaky valves causing compression leaks, and fifth, weak batteries, and sixth, poor mixture. It would be well to look over these things and decide by elimination which is the real cause.

3—Details of this car have not been announced. Motor Age has no details of it other than the fact that it is to be a 60-horsepower car, as mentioned in the issue of April 17, page 17.

BOSCH DIAGRAMS EXPLAINED

Previous Issue Outlined the System Fully —Splitdorf Type T-S

Boston, Mass.—I would like to ask some questions relative to the diagram of the Bosch dual system which appeared in Motor Age December 5. Does the secondary current come from the collector ring, marked 3 in the diagrams, in both battery and magneto positions, as indicated? I suppose that the battery secondary current was generated in the coil.

2—Does not the magneto primary current, in the battery position, Fig. 1, go to 2, then to 6 on the coil and from there to ground, same as in the off position?

3—Is the diagram, Fig. 7, in the same number intend to show the internal coil circuits for the diagrams, Figs. 1, 3 and 5 of the Bosch dual system?

4—Will you illustrate the Splitdorf dual system, T. S. type, with explanation, or if it has been previously illustrated, refer me to the issue?—Student.

1, 2 and 3—The Bosch dual system was fully described and illustrated in the issue of April 17.

4—The Splitdorf type T-S is illustrated in Fig. 2. The battery is connected to the two points B of the coil. One of these points is connected with one end of the primary winding. The other end is grounded. The wire A is the armature wire to the magneto and D is the high-tension distributor. The low-tension carrier from the breaker box is designated as P. G is the ground wire and is fastened to a point on the magneto base.

WIRING FOR FULL SET OF LIGHTS

One Switch For All Lights Eliminates Unnecessary Wiring

Gazelle, Cal.—Editor Motor Age—Kindly publish a diagram for wiring an 80-hour Miller battery for electric lights on a 30-35 Reo roadster. The lights are a full set, tail, side and front.—J. P. O'Shaugnessy.

The wiring diagram for headlights, tail and side lights is shown in Fig. 1. The lamps are connected in parallel. The switch shown in the illustration is called a five-point switch and is for the purpose of lighting any or all of the lights and may be purchased from any of the following: Westinghouse Electric & Mfg. Co., Leece-Neville Co., Cleveland, O.; Northeast Electric Co., Rochester, N. Y.; Cowles & Co., New Haven, Conn, and the Adams, Bagnall Electric Co., Cleveland, O.

MOTOR CAR ENGINE FOR MARINE

Motor Should be Designed for the Boat—Not All Will Do

Flint, Mich.—Editor Motor Age—Will Motor Age advise why it is that a motor car motor will not work as satisfactorily as a marine engine in a boat. I have noticed several discussions in marine magazines in which they state that a motor car engine cannot be made to work satisfactorily and at the same time give no definite reasons why. I know of an M-17 Buick motor in a 25-foot boat with a 5½-foot beam which works very satisfactorily, and would like to know if there is any reason other than the marine companies wanting to discourage one in putting a motor car engine in a boat.—H. A. Cook.

Providing the proper engine is placed into the boat there is no objection to using a motor car engine for marine purposes. In selecting such an engine it would be well to consider first the strength of the boat, second the horsepower required to properly propel the boat and third the weight of both boat and engine. It would not do to put an exceedingly heavy engine into a frail structure, for this would mean that the timbers soon would be shattered.

Then, again, it would not be good practice to place a small engine in a large and heavy boat, for this would mean a short life for the engine. It is possible that the Buick engine of which you speak is of proportion to propel the small boat into which it has been placed, but it does not follow that any motor car engine will do the same thing. Motor Age suggests that you get the horsepower necessary to properly carry the boat and then consult a marine engineer as to the weight of engine the boat will carry safely. Racing boats sometimes are fitted with motor car engines with good results.

NOZZLE CHANGE FOR PRESENT FUEL

Alteration of Float Level in Old Carbureter May Be Sufficient

Greencastle, Ind.—Editor Motor Age—In our Overland runabout, made at Terre Haute some 6 years ago, I have a Longuemaire eight-multiple-jet carbureter. Should the jets be enlarged and the float weighted to adapt it to our present day gasoline? The gasoline level is ¼ to 5/16 inch below the openings in the nozzle.

2—Can a roller timer be used satisfactorily with a dead coil, using batteries as the source of current?—Ewing McLean.

1—It may not be necessary to enlarge the jets if the float is weighted to raise the float level. Carry the float level as high as possible without flooding. If this does not give the desired results it means that the jets should be larger.

2—If by "dead coil" you mean a non-vibrating coil, you will need some means of rapidly making and breaking the circuit, like the vibrator or the breaker box in the magneto does.

OBSTINATE LOSS OF COMPRESSION

Reader Rebuilds Motor and Still Has Leak In Third Cylinder

Greenville, Miss.—Editor Motor Age—I have a two-pole vibrator which I want to use in connection with a Presto-O tank to light my front lamp. Kindly give a drawing showing how to rig up same. My car is a Ford model T. Would it be better to use the master vibrator instead?

2—My car has given me perfect service for 3 years with the exception of the third cylinder losing compression after about 100 miles driving. All the other cylinders will run for over 1,000 miles without weakening. I have looked for leaks, changed pistons, changed rings, cut my oil down, raised the oil, put in leak-proof rings, cut holes in the piston, changed valve stems and push rods, and as a last resort bought a new motor and changed vibrators, yet I have the same results. The front cylinder gets more oil than any other two, yet gives me the least trouble. The motor will start on compression seventy-five times out of one hundred, unless it stops on the third cylinder.

The factory says, too much tinkering is my trouble, but what am I to do, if they don't tell me what to do? I can't drive a lame motor. Outside of this the car has given me perfect service for 37,000 miles and is still on the job, and too good to throw away. I hope Motor Age will help me out, or some reader come to my rescue.—A Reader.

The only thing that suggests itself is that there is some obstruction in the cooling system. Inasmuch as the third cylinder always is the least cooled, any interruption to the flow of cooling water would affect the third cylinder first. If this cylinder gets overheated the excessive wear would cause a rapid loss of compression. Perhaps some other reader has a suggestion or has had a similar experience.

PUZZLED BY OVERHEATED MOTOR

Water Is Circulating Properly—Reasons for Water Boiling

Wilsonville, Neb.—Editor Motor Age—I desire to know what causes a radiator to heat so that the water boils over every time the car runs. I have a Mitchell 1910 roadster with a Holly carbureter. The past month it has heated very much. Have had the radiator flushed out. The circulation is all right. What is the trouble?—Chas. Mousel.

Granting that the water is circulating

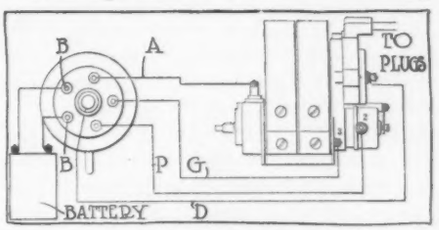


FIG. 2—SPLITDORF MODEL T-S WIRING

properly through the cylinders, a number of reasons may be advanced for the water boiling. In the first place a very common cause of overheating is carbon. The presence of this element in the cylinders in undue amount will cause preignition which in turn causes heating. A loss of power is evident also. Some times backfiring may be heard. Too rich a mixture is another cause of overheating. See that the carbureter is properly adjusted and that the fuel valve is seating. The oil level in the crankcase should be watched and neither too much nor too little oil supplied. Disconnect the muffler and if the boiling ceases it may have been due to a choked muffler, which causes excess back pressure. These are the common causes of overheating, but Motor Age suggests that you see that the fan belt is not slipping and again examine the water circulation.

KNOBBED TIRES AND STEERING

Use of Such Tires Does Not Make Steering More Difficult.

Marshfield, Wis.—Editor Motor Age—The writer has just purchased a Michigan 40 and has had it equipped with Morgan & Wright nobby tread tires on all four wheels. There is a great deal of argument here as to whether this was the proper thing to do, some stating that it makes steering harder, others that the gasoline consumption is more, etc. Will Motor Age please advise its best judgment in this matter? Undoubtedly it will be interesting to others.—A. Neumann.

The use of non-skid treads tends to decrease gasoline consumption because with such tires the car gets better traction and hence the loss through slippage is lessened. If anything, the use of such tires makes steering easier.

TO CHARGE BATTERIES IN PARALLEL

Lighting Generator Will Take Care of Extra Load

Jefferson, Ia.—Editor Motor Age—I have a car carrying a Gray & Davis lighting generator of the larger type, an Exide 6-80 battery for lighting and an Exide 6-40 battery for auxiliary ignition current. The lighting battery only is charged from the generator. The output of the generator is 8 amperes at 10 miles per hour in high gear. Would it be practical to connect the two batteries in parallel, and increase the generator output to 12 amperes, thus charging both batteries from the generator? Most of my driving is done on open country roads at a car speed in excess of 10 miles per hour, so it would make little difference if the generator did not cut in until the speed had reached, say, 15 miles per hour.—C. D. Enfield.

Yes. It will mean simply that you will take more current from the generator for charging and the generator will not cut in at as low a speed as it does now.

NO HELP FOR WATER-SOAKED COIL

Insulation In All Probability Has Rotted—Useless to Recover Wire

Hamilton, O.—Editor Motor Age—Kindly state whether or not anything can be done with a Heinze four-cylinder spark coil that was under water for 2 days in the recent flood. If it can be repaired, please instruct me how, or give me the address of some one who is able to do the work.—Albert Straus.

The only one who would be able to repair the coil properly would be the Heinze Electric Co., Lowell, Mass. However, it is doubtful whether it can be repaired and be fit for service. No doubt the insulation of the windings has been injured and this means an inspection, together with insulation repairs if necessary. Motor Age suggests that you get a new coil.

Timely Communications from Readers

COMPULSORY DRAGGING OF ROADS

Iowa Farmer Advocates Law for Work on Frontage Basis

ALBURNETT, Ia.—Editor Motor Age: I am going to write a little on the subject of good roads. I have read a good deal in Motor Age about good roads, and no one seems to know where the money goes that is spent for the building of good roads.

Now, what should be done is to pass a law compelling every farmer to drag the road free according to the amount of land he owns. The money that is spent for dragging roads should be spent for building roads and bridges. I have talked with some of the farmers in our county and most of them would each drag his portion of the road without charge if all would do so. I would do my share. I have dragged roads for 3 years and have never collected 1 cent for my work. Some of the farmers drag the roads when they have time and not at the times when the roads need it or it would do the most good and the county has to pay for this ineffectual work. It is just throwing that money away.

We should stop drawing the money out of our county treasury road fund. If the gas of a car tank leaks one is not going to let it continue to leak and keep putting in more gas. He is going to stop the leak. Now, let us stop the leaking out of our road fund.

The man in the city puts in a sidewalk and paving and pays for it. He pays for the paving in front of all of the property he owns, and the farmer has just as much right to the use of that street as the man who paid for it. The city man also is compelled to have the snow removed from the sidewalk in front of his property.

So I think the farmer should be obliged to drag the roads without charge. He does nothing on the roads but what he is paid for. We never will have good roads until we stop spending our money for things that should be done without cost to the county. Where would the city be if it had to pay for all of the paving and all the sidewalks and for keeping them clean? They wouldn't have any sidewalks or any paving.

Let me direct attention to the small town where there is no paving. In the spring of the year the streets are in bad condition and you should hear the farmers put up a howl about the streets being so bad, but they do not say anything about the condition of the roads in the country.

Some farmers will say they have not time to drag the roads. I will admit there are times when it is hard for a man to drag the road just when it needs it, but if there were a law compelling him to do his share, he can always get his neighbor to help him out in case of a pinch.

I was born and raised in the country and am now on a 300-acre farm of my father's, and I find that the average farmer will not do any more than he has to. If he has a little spare time he goes to the city and spends his time on the street corners. If he were obliged to do his share of the dragging of the roads he would do it himself rather than hire someone. If one lives in the city and is in some business for himself or is working for some firm, he has to be there at 7 a. m., and if the walk is covered with snow, he gets up in the morning and shovels it off or hires someone to do it. Why cannot the farmer do the same?

There are two things on the farm I pay very close attention to, and they are my expense account and lost time. Time is money, and whenever a farmer loses time he loses money. When a farmer figures on making time at whatever he is doing and on doing the work as well as it can be done, then keeps an expense account and endeavors to keep it as low as possible instead of trying to see how high it can be run, he will have time to drag the roads after each rain. If the farmers only could realize how much time is lost, and how great is the wear and tear on harness, horse and wagon in marketing their products over poor roads, they certainly would drag the roads without anyone compelling them to do so.

There is one place I find I cannot make time, but am continually losing time, and that is on the roads. If each farmer would do his share of dragging the roads it would mean about ½ hour's work after each rain, and it would mean a good deal to our road fund, and at the same time the roads all over the state would be dragged when they need it. Then the roads would not have ruts in them, and we will never have good roads as long as we stay in the same old ruts. The farmers have the horses, the tools and the power, and if they will only do the work we will have good roads all over the state. I would like to hear from some other brother subscribers. My motto is, "Time saved and expenses reduced."—C. F. Maier.

TRICKS IN MEMPHIS REVEALED

Cops Capitalize on Sporting Blood of Tennesseeans

Memphis, Tenn.—Editor Motor Age: In looking over a recent number of Motor Age, I noticed a report on some speed traps, blots on the face of our fair country, and it brought to my mind one of the recent stunts some of the motorcycle policemen have been putting into practice in this city. This particular stunt may not be anything new but nevertheless it is creating a good deal of that ruffled-feather feeling amongst some of the victims as well as those who might also be caught in this trap.

You will be driving along a nice asphalt street in your car which you feel has about 60 miles or so in her, and some other car

Motorists Offer Pertinent Suggestions

about the same size and power comes up behind you running about 20 miles an hour, passes you gradually then slows down and lets you pass, doing this several times until you get sore. You then make up your mind to leave your tormentor behind, which you try to do, but it seems that you can't just catch it until the throttle is wide open.

Then, when you get just even with it and feel that you have been able to show greater speed and are much elated at the fact, presto! the worthy motor policeman arises from his hiding place in the other car and announces with great gusto, "Drive to the police station, you're pinched for speeding!" Whereupon you smother various and sundry words containing sulphur and brimstone and allow yourself to be shown the method of preparing to have $50 extracted from your bank roll. And you wonder how much the motor policeman will get and if he will divide with his chauffeur friend who helped him with his little game of spider and fly.

I would like to see expressed in the columns of Motor Age the views of other readers and owners as to whether or not a motor policeman is not overstepping his authority in putting this snide trick into effect at the expense of motorists and the benefit of himself and the city coffers. As we know, the motorist has little or no recourse from such tactics and this brings to my mind the question as to whether or not a motorist should feel justified in trying to ditch his royal highness at the next meeting.

There are numerous tricks which the driver may resort to to get even with this fellow, even though one of the two will surely get hurt, and it follows that it will not be the one on four wheels.

Such methods of arresting unsuspecting speeders may prove effective in some cases, but I believe it only tends to put venom in the hearts of motorists so tricked and has a tendency to encourage underhand work amongst chauffeurs and drivers. This in time will make it a very dangerous matter for a motorcycle cop to ride alongside an offending driver as the driver may or may not take the chance of wrecking his car in order to hurt the policeman. We have read from time to time that such accidents have happened.—Tuck.

Lighter Delivery Cars

Mankato, Minn.—Editor Motor Age—Following what is being done by small motor vehicles in this community it occurs to me that most of the delivery vehicles are too big for package work in a small town where 2 miles is the maximum run. Any small motor vehicle with a 350-pound capacity could handle package work in a small place as well as a 1000-pound car, carrying smaller loads but making more deliveries per day. I believe a small vehicle at a low price would sell.—Parcel.

FAVORS ELECTRICITY AND HAND

Minnesotan Believes These Two Only Successful Cranking

Sauk Center, Minn.—Editor Motor Age: I have been investigating the various starters now being placed upon the market and find by carefully looking into details and mechanical arrangement that the only starter which is practical and no doubt will find favor with the great majority of motorists, is the cranker which operates either by electricity or hand power as this is the proper way to start the motor. I have been long in doubt as to the real practicability of the various devices for starting the engine of a motor car with gases of various kinds, as the real object to be sought is lost in most cases, delivering to the motor a sledge-hammer blow when all of the mechanical parts are at rest. On the other hand, the starter which rotates the motor is installed easily, sells at a low price, has no up-keep cost, is durable, is the one and the only one which will find lasting place with the practical motorist.

The compressed-air starter is practical as it forces into the cylinder ready to receive it, a powerful charge of air which forces the motor to rotate and thereby take up its regular rotation as though it was cranked by hand. This type is one of the best starters, but the price is too high for the average owner. The starter with the wound spring is also a good one, but here again the price is too high, and too much delicate mechanism, which must, of necessity, cost too much for general introduction. There are two starters of the mechanical type, one costing $10, the other costing $20, and both of them will with precision and certainty start any car from the seat, not 75 per cent of the time but 100 per cent, or, every time, and the cost must invite general use in the next few years.

But we must go further and ask all makers to equip all cars made from the $525 runabout to the $10,000 city car, with a cranker, one which a woman can operate easily from the seat. Some of the crankers now upon the market are so sure to operate that the starting crank is of no further use, while some others do not disturb the crank, allowing it to remain in its place if desired. The electric starter has found much favor with certain classes and it is without doubt a practical device, but we must believe it is too complicated and costly for general introduction on cheap cars, while the ones above referred to at $10 and $20 will be within the reach of the ordinary pocketbook, and will, no doubt, meet with a large sale.

The two seat crankers mentioned are provided with automatic devices which take care of the back-fire should one occur, and no harm is done, while one of them goes so far as to fix the spark just right in order that a back-fire may not be possible, but should it, by any way happen no harm is done to the machine, and one can promptly repeat the operation of rotating the motor as often as desired the same as with the starting crank. I believe this is the coming, practical type for starting. I do not doubt that these devices will be incorporated and made a part of the motor in some of the leading medium-priced cars for the next year, which hope, if realized, will bring additional pleasure to motoring.—A. D. Carpenter.

MAGNETO AND 6-VOLT BATTERY

Two Should Work Properly—Will Install Starting Generator

Horton, Mich.—Editor Motor Age—I bought a car last fall fitted with a Splitdorf magneto that used a 6-volt storage battery for starting. In a short time I found the points of the magneto were burned off. A repairman suggested that I use dry cells instead of the storage battery because with the Splitdorff magneto and storage battery I was likely to have trouble any time. I am having an electric-lighting and starting system with a 6-volt storage battery and generator installed, and wish to do away with the dry cells, using the 6-volt storage battery for starting if I could do so without having magneto trouble. Has Motor Age any suggestions to offer?—Serens Wellman.

There is no reason to believe that you will have trouble with the magneto after installing a starting and lighting system. The magneto is separate entirely from these two and since originally the magneto worked in conjunction with a 6-volt battery there should be no trouble in returning to that system if care is taken to make the proper connection.

THE FUEL VALVE IS NOT SEATING

Cold Intake Manifold Causes Condensation And Slight Leaking

Columbia, O.—Editor Motor Age—I am driving a 1910 E-M-F 30 with original carbureter and have trouble with leakage on stopping the engine. Am told this style of carbureter should leak four or five drops on stopping the engine, this being gasoline which has condensed and run back. But usually there is a steady stream running from the bottom of the carbureter. I have a new float, have ground the valve seat, and have lowered the float until the engine starts hard, still there is the same loss. I always throttle the engine down as much as possible before throwing the switch and this helps some but does not completely stop the leakage. Sometimes there is a pool of gasoline 2 feet in diameter under the car. Can Motor Age give me any advice?—B. M. Hyde.

The fact that there is a steady stream of gasoline from the carbureter tends to show that the fuel valve is seating improperly. While the gasoline is running out of the carbureter move the float up and down very rapidly by means of the flooding device and if the leaking stops, it is evidence that the fuel valve has been forced back onto its seat. Granting that all connections are tight and that the fuel level is not being carried too high, the above seems the only plausible explanation of your trouble. Most carbureters will leak slightly due to condensation, but it can be determined easily whether it is condensation alone by running the motor until the intake manifold is hot and then note if it leaks immediately after the motor has been shut down. The condensation occurs only in a cold manifold. If the leaking occurs with the manifold in a hot condition look at the seating of the fuel valve.

Gray Pneumatic Gearshift Eliminates Both Hand Levers

Controlling the Car by Air Latest Development in Luxuries for Motorist

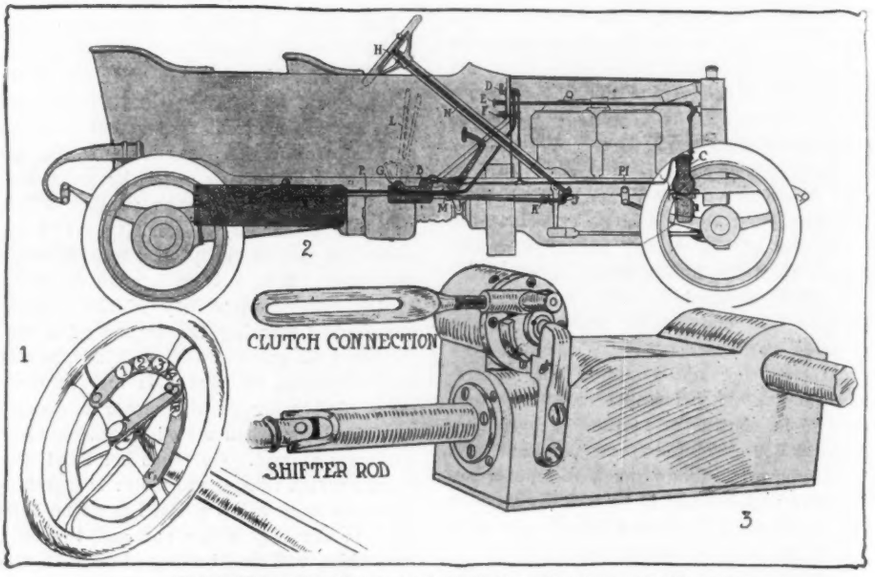
PROBABLY the average motorist's dream of an ideal car has as one of its chief items, the absence of the gearset, or at least the absence of the necessity of manual gear changes. With motors in their present state of inflexibility, doing away with the gearset altogether is somewhat Utopian, but when the unhandy gearshift lever is abolished a long step is taken toward the ideal.

Such a step is made possible by the appearance of the Gray pneumatic gearshift in marketable form. This is the invention of Edward E. Gray of Plano, Ill., a son of the famous inventor, Elisha Gray. In its experimental form it was described exclusively in Motor Age, September 19, 1912. It is being marketed now by the Research Co., Chicago.

Description of System

In general, the system consists of a method of making the gear changes by compressed air, the speed combination being selected by the movement of a small lever on the steering column, similar to the throttle lever. A speed change may be anticipated and the lever set to the notch corresponding to the gear combination which may be needed later. When it comes time to change speed, the release of the clutch accomplishes the change automatically. In order to complete the clearing of the forward compartment, the scheme also embraces the substitution of a pedal for the emergency brake. The early designs contemplated a small hand wheel and indicator on the steering wheel for the speed selection, but the small lever has been substituted.

Compressed air for the system is provided by a four-cylinder pump gear-driven from the crankshaft or gearset shaft and maintaining a pressure of 200 pounds per square inch in a supply tank. When the tank pressure falls below this figure automatic connection is made between motor and pump by a pneumatic clutch. When the pressure reaches 250 pounds the pump is released automatically. The air thus provided is employed for cranking the motor, inflating the tires and jacking up the car, in addition to its main function of shifting the gears. A feature of the system is that it may be applied to any car having the usual selective gearset. According to the Research company any garage employe can equip the car in a few hours and without any trouble or unnecessary delay.



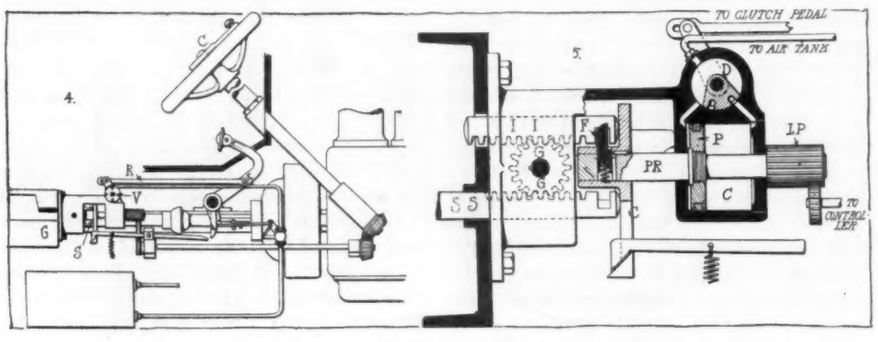
FEATURES OF GRAY AUTOMATIC GEARSHIFT CONTROL

Fig. 1 shows the steering wheel with special sector for gear changing. Fig. 2 shows the general installation of the air system. Fig. 3 illustrates the shifter mechanism attached to the gearbox

General Installation

The general installation of the system is shown in Fig. 2. The pump is located in this case at the front of the motor, storing air in the pump A. The shifter proper or selector, is attached to the gearset housing and moves the gears to the proper combinations by means of an air-operated plunger which acts on the regular shifter rod. In Fig. 4 the complete installation is shown in condensed form. At C is the control lever illustrated in Fig. 1. It is connected by a shaft inside the steering column by bevel gears and a shaft to the selector at S. This selector is mounted on the front of the gearset case, G, and connected to the clutch pedal arm by the rod, R, which actuates valve, V. At the right of the figure the selector mechanism is shown in detail section. At SS are shown the shifter rods of the gearset, which are cut to form racks.

At D is located the air distributer, which is controlled by the clutch position. With the clutch engaged this valve is closed; when the clutch is just disengaged the valve is in the position shown, admitting air behind the piston and forcing it back. At C is the neutral collar, which is integral with the piston rod PR, and which on its back stroke throws the forward rod back even with the rest, which draws any engaged gear out, producing neutral. A further depression of the pedal closes this port, and the valve registers with the opposite one, forcing the piston forward, the finger drawing the rod selected by the position of the controller forward, engaging that gear. When the controller is set at neutral, the finger does not engage any of the gears. The selector finger is in the form of a latch, so that when the controller is moved when in gear it is turned out into the adjacent space, engaging with the indicated rod, when the gears are thrown into neutral by the valve action.



INTERNAL MECHANISM OF GRAY GEARSHIFT

Fig. 4 is a condensed view of the connections of the air system and Fig. 5 illustrates the details of construction of the selector

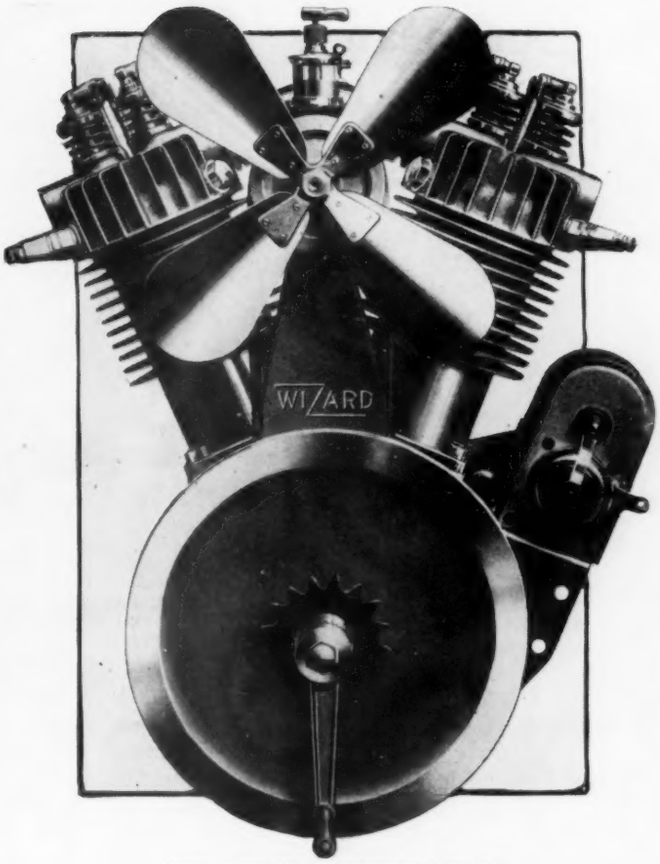
Pressure Required

A pressure of 15 pounds is required as a minimum to operate the device, 40 pounds being recommended. Very little air is required to operate it, pressure being the prime requisite. As the manual con-

nections consist of only a rod connected to the clutch pedal arm, and a small mechanical stop to prevent release into neutral on the engaging stroke of the clutch pedal, no appreciable extra pressure is required in its operation.

With these controls it is possible to accomplish a change of gear in a fraction of the time required by even the most skillful operator, using the usual method. No more effort is required to change gears than to operate an electric, progression through the gears for a quick getaways, as required in traffic, may be made silently, and as rapidly as the clutch pedal can be depressed, the controller may be moved to a lower gear, on ascending a grade, ready to shift at the crucial moment, by a simple depression of the pedal. Neutral may be reached with the controller in any speed, by depressing the pedal half way, thus making it possible in slow running in traffic to change from neutral to first or vice versa by manipulation of the pedal alone; and finally, damage to the gears is impossible, except through too sudden operation of the clutch or wrong selection of gears.

A car was equipped with this appliance 18 months ago, having since been run without a change-gear lever, or other control than that afforded by the device. In a test by Motor Age last summer its operation seemed perfect. Gearchanging was accomplished silently without usual levers.



NEW WIZARD CYCLECAR MOTOR

Two Cyclecar Engines on the Market

The Wizard and the Spacke

THE Wizard Motor Co., Indianapolis, Ind., announces a new cyclecar motor —an adaptation of its motorcycle motor but fitted with outside flywheel and four-bladed belt-driven fan.

The motor is exceptionally neat and weighs complete under 100 pounds, though rated by the factory at 10 horsepower. The bore is 3⅜ inches and the stroke 3⅞ inches. The valves are overhead and both mechanically operated. The cylinders and valve chambers together with the exhaust and intake passages are cast in one piece, doing away with all joints in the compression chamber.

The company reports a large interest in cyclecars and the sale of a number of its cyclecar motors.

With the phenomenal growth of the cyclecar idea there has sprung up a demand for a motor fitted to the new requirements of the small vehicle.

As a result a motor especially built for cyclecars has been produced by the Spacke Machine Co., Indianapolis, Ind. Realizing that the motorcycle motor manufactured by it for motorcycles was not exactly suited to cyclecar use this firm has added to the design to meet the new requirements. To add to smoothness of running an outside flywheel has been fitted to which the chain sprocket to the countershaft has been fastened direct. Besides this, a fan and fan drive mechanism has been added as shown, to assist in cooling when the motor is enclosed, or partially so, as in most types of cyclecar.

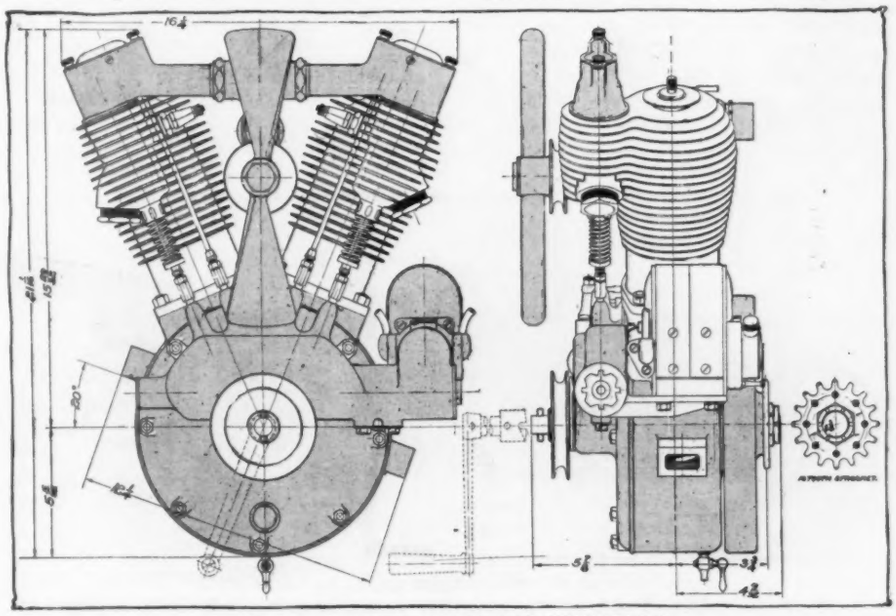
The whole makes a very workmanlike job, compact and powerful and fairly light in weight. The motor is known for its quietness, the inlet valve tappets being enclosed and all parts designed for silent operation. A large demand for the motor already is reported.

Since one of the primal questions confronting the building of a cyclecar is the layout of the power plant, the dimensions of the motor are of importance. The chief dimensions therefore are shown on the accompanying illustration. It will be seen that the maximum width of the motor is 16¼ inches. A much narrower hood may be employed if the heads of the cylinders are allowed to protrude from the sides of the bonnet as is done sometimes in Europe by designers of cyclecars.

The motor is built in 7 and 9 horsepower size, being dimensioned as follows, according to the maker, the Spacke Machine Co. of Indianapolis.

Bore	3.50 inches
Stroke	3.67 inches
Displacement	70.62 cubic inches
Revolutions per minute	2,500
Actual horsepower	13-14
Extreme height	21 inches

The weight is about 116 pounds complete.



SPACKE SPECIAL MOTOR FOR CYCLECARS

Monarch Looks European

Sloping Hood With Radiator Underneath It Is One of Features of Detroit's Latest

DETROIT'S youngest car-building concern, the Monarch Motor Car Co., whose formation recently was announced in Motor Age, has one of its cars completed and undergoing road tests. With two exceptions the car conforms to usual practice. One exception is in the location of its radiator, which is placed under the hood but forward of the motor. The hood slopes downward from the dash, somewhat after the European fashion, the filler cap just barely protruding above the top of the hood. This arrangement gives the car very pleasing lines as the body is of the stream-line torpedo type.

Another feature which may as yet be considered as unconventional, is the location of the gasoline tank under the cowl at the front of the dash. This is a growing tendency with American makers but up to the present adherents to this type have been decidedly in the minority.

The car is a 25-horsepower creation, its four-cylinder motor having a bore of 3 3-16 inches and a stroke of 5 inches. The cylinders are cast in pairs. The connecting rods, pistons and all reciprocating parts are made as light as possible to aid in the elimination of vibration and to permit of higher engine speeds without injury to the motor. The motor is especially designed for the car and is constructed along European lines, both from stroke-bore ratio and light weight.

Motor Details

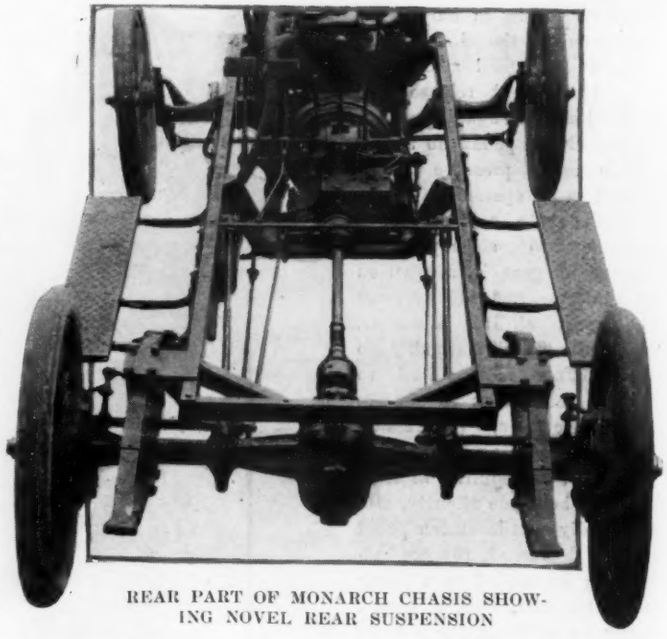
Cooling is by thermo-syphon circulation of water. Timing gears are at the front of the motor and the teeth are cut spirally to reduce noise. They are accessible on removal of the gear cover in the conventional way. The carbureter is on the right side of the motor and has a very short intake pipe without pockets. This arrangement is designed to reduce condensation and thus improve carburetion, an item which is becoming an important one in these days of low-grade fuels. The feed pipe from the gasoline tank to the carbureter also is very short compared with the usual practice, due to the dash location of the gasoline tank. The chief advantage urged for this is that a flow of fuel is assured on grades as long as there is any gasoline in the tank.

Lubrication of the motor is of the combination force-feed and splash type. The oil is pumped from the bottom of the crankcase up to the timing gears and to the main bearings, whence it feeds to troughs under the connecting rods. These splash the lubricant up into the cylinders, lubricating the pistons. It then flows down into the crankcase reservoir at the bottom where it is ready for recirculation.

The Transmission System

Circulation is maintained by a plunger pump operated from the camshaft. Motor and gearset are mounted on tabular members which parallel the side frame members supported on cross members dropped from the frame at front and rear of the power plant. A leather-faced cone clutch is used. To make clutch engagement easy, clutch-facing springs are placed under the leather facing. Change gears are selective giving three speeds forward.

An unineclosed drive shaft conveys the turning effort to the rear axle. Two universal joints, one at the rear and the other at the front make up misalignments due to road inequalities. A feature of the latest arrival to the motor car field is the rear spring suspension. Instead of using elliptic springs in the usual way, the lower portion of the spring is underslung, that is, it is fastened to the under portion of the rear axle casing. The spring clips too, are odd, being U-shaped as against the conventional angular form. Both the spring suspension and spring clips are discernible in the photograph of the rear end of the chassis, shown on this page. A gear ratio of 4⅛ to 1 is used in the rear axle. The latter is of the semi-floating type.

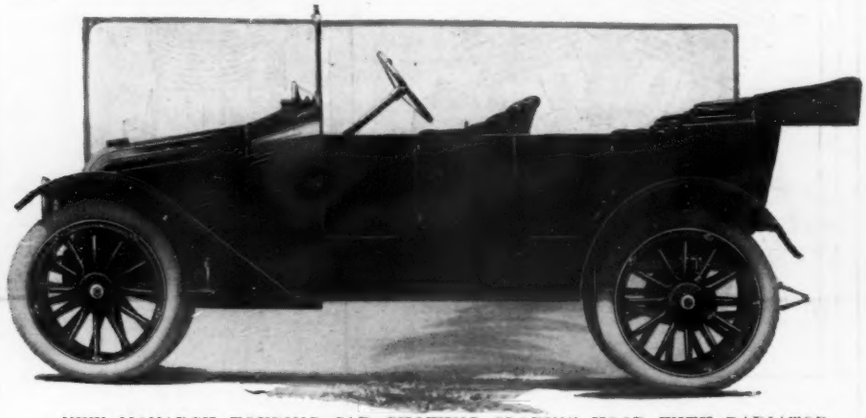


REAR PART OF MONARCH CHASIS SHOWING NOVEL REAR SUSPENSION

Left Drive and Center Control

Left drive and center control are features of the new Monarch. A cranking system is provided. This, together with the lighting system, is electrically operated.

That this is an age of equipment has not been overlooked by the manufacturer. A few of the appurtenances are a rain vision windshield, electric horn, extension top and side curtains, demountable rims, speedometer and tools. The new product is a 110-inch wheelbased car, selling at about $1,050 as a five-passenger touring car.



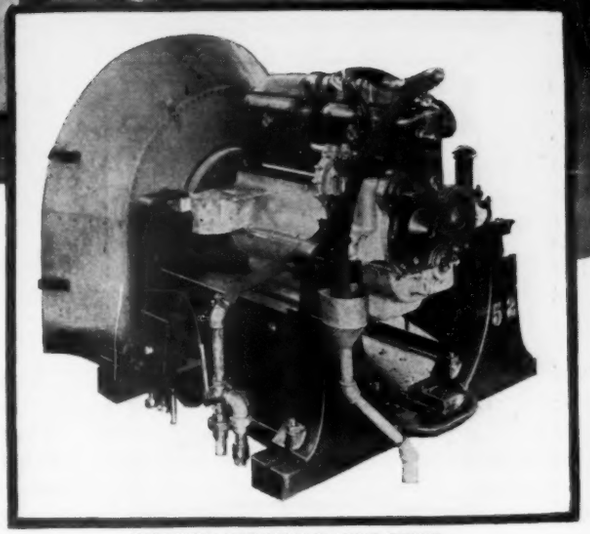
NEW MONARCH TOURING CAR SHOWING SLOPING HOOD WITH RADIATOR CAP PROTRUDING

GROSSMAN WINS COURT CASE

New York, June 16—The Emil Grossman Co., maker of Red Head spark plugs and other motor car accessories, scored a victory in the United States circuit court of appeals recently when the application for a rehearing of a suit for contempt brought by the Rajah Auto Supply Co., was denied. The appeal grew out of an adverse decision against the supply company which had brought suit against the Grossman company for inadvertently selling conical repair porcelains to one or two persons who had sent in orders which were declared to be decoys. The lower court decided against the Rajah company when the defendant proved it did not make a business of selling conical repair porcelains particularly for Rajah plugs but that they were supplied for repair purposes.

How Motor Car Engines Are Tested in Continental Plant

NEW MOTOR TESTING PLANT



ENGINE ARRANGED FOR TEST

CONTINENTAL ENGINE ON TEST

By George W. Yeoman

WHEN the Continental Motor Mfg. Co. built its new plant in Detroit it determined to have the best, safest and most efficient testing department for motors that modern ideas and skill could provide. Special stress was laid on this feature because the testing of Continental motor is one of the most important and thorough phases of its manufacture.

These testing operations are arranged in several stages. The motors are first run in by belts for 3 or 4 hours before going to the test blocks. Next, in the test room they are placed on the individual blocks and run in by their own power for 4 or 5 hours. After the oil pan has been taken off and the bearings inspected, they are run for 3 hours more and again looked over. The night testers then run them continuously through the night under load. After this thorough treatment they are torn apart and thoroughly examined and adjusted so that they can be placed back on the block for final running and the necessary tuning up process.

Fire-Proof Test Room

It can be seen from this that the block test room is one of the most important departments of the plant. This department, however, always presents certain problems that under old-fashioned methods of manufacture frequently lead to dangerous fires and explosions, and it was these that it was sought to avoid in designing and equipping the new factory.

When a cylinder misses fire, which frequently happens with a new motor when it is first run, an explosive mixture of gas enters the exhaust line. The motor on the next block may happen at that time to be taking a rich mixture of gas from the carbureter, which causes it to send a stream of flame into the exhaust line. This flame, striking the mixture of gas from the cylinder that has missed fire in the other motor, will ignite it and an explosion occurs. The explosion frequently sets fire to the lubricating oil discharged from the engine and found in the bottom of the exhaust line. The burning oil is extremely dangerous in such a place because there is always more or less gasoline about. It was just such a problem as this that it was wished to solve when the company designed its new plant and it gave special consideration to the testing department in an endeavor to prevent these explosions and fires.

Motors on test exhaust into a trench which has loose covered plates so that the trench can be cleaned at any time. These exhaust trenches are connected with a large exhaust fan located in another room separated from the testing department by a fire wall. To avoid explosions an opening is left near each engine exhaust which pulls in fresh air and dilutes the exhaust from the engine so that it is too weak to explode.

Metal doors are suspended in each branch of the tunnel. In case of fire they drop automatically and confine the fire to one section. Refuse oil is drained away from the fan and there is a sprinkler system in the trench. The gasoline piping is of brass and located below the floor line and is supplied from an underground storage tank outside the building.

Water is circulated by a centrifugal pump and the system is elaborate and efficient. It is so designed as to keep the water between 160 and 200 degrees and a thermostatic valve in the storage tank opens automatically at 200 degrees and discharges the water. Test stands are built so as to accommodate different models. Drain pans and drain pipes collect the oil spilled by the motor and return it to the storage tank, where it is filtered before using again.

Special Testing Equipment

The building, constructed to take care of 115 motors a day, is one story in height, with monitor roof, and designed to secure the maximum amount of light. It is fireproof, not a stick of wood being used anywhere in its construction. In order to facilitate the handling of the motors an electric crane is rigged to run the entire length of the building. It picks up the motors and places them on the blocks and also delivers them to the shipping department. This means quick handling in the plant.

Housing the Motor Car

The Apartment House Garage

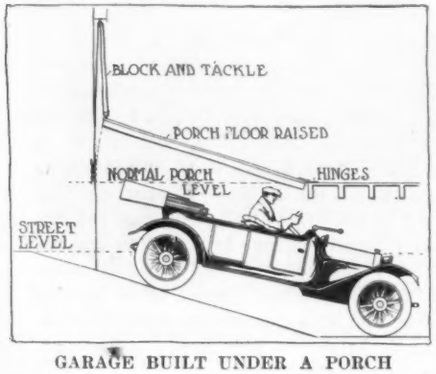
IT IS hard to understand why in many instances a tradesman deliberately neglects himself, why a shoemaker goes poorly shod or a tailor poorly clad, but such often is the case. A canvass of Chicago showed that the contractors and builders on the contrary are quite particular as to the beauty and arrangement of their garages. In not a few articles on garages appearing in Motor Age, it was shown that contractors had built their garages. Philip Lotz, a Chicago contractor is not an exception to the average run, for his garage is ideal for the purposes intended.

Of terra cotta brick facing, the garage as a whole becomes attractive only when the view comprises it and the home of the owner. The latter is of the same material and is situated about 15 feet from the garage. Within the 18 by 22 foot garage building is everything that the average motorist would desire and much more than is usually seen in most garages—ample room for three cars. Even though one only is stored in the garage, the owner, in building, foresaw that upon the arrival of visitors to his home, their cars too could be accommodated.

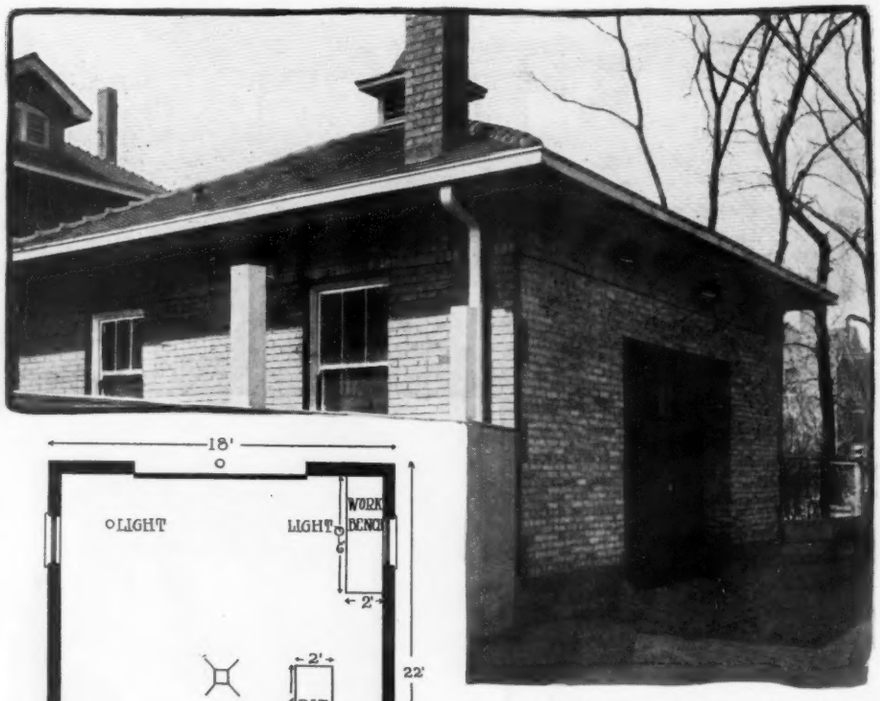
Repair Pit in Floor

The floor of the garage, of course, is of cement. A small pit 2 by 4 feet is covered with wood planks. It was thought advisable to use a small pit in order to make minor repairs underneath the car, the more intricate jobs being left to the factory.

As will be noticed from the diagram of the floor plan shown below, the lighting arrangement is a feature. Besides having five large windows, the two car entrances are provided with glass at their upper portions. Lighting at night is obtained from tungsten lamps with reflectors. Of these there are four, one of which is used for illuminating the work bench. This, as will be noticed, is in the corner of the garage, directly below a window, so that work during the day is facilitated. The work bench is but 2 feet wide and contains drawers for the safe-keeping of tools.



GARAGE BUILT UNDER A PORCH



FLOOR PLAN OF LOTZ GARAGE

GARAGE OF PHILIP LOTZ, CHICAGO

A 40-gallon gasoline tank is underground and about 15 feet from the pump. Oil is not stored, the owner believing that it would not pay to carry the small supply necessary for the car. Instead, a few gallon cans are bought and when these are empty, others are substituted.

Although there are two entrances of ample size to permit of the passage of a motor car, conditions allow but one to be of value. This entrance is on the alley side of the building and shown in the illustration on this page.

Many owners are contemplating building a garage for their own use, instead of keeping their cars in a public station and as this is the season of the year when such building is done a few hints will be of value.

The heating proposition seems to trouble many builders, for sometimes one does not wish to go to the expense of installing a hot-water system or steam plant for the intermittent heating of the garage. There seems no reason why an electric heater could not be used to advantage, for this would save both space and trouble, although economy is probletmatical.

Sinking the gasoline tank seems to be universal, but there has appeared on the market a number of safe systems which do not require tank burial

Garage Built Under a Porch

Although Allegheny, Pa., is not an overcrowded city, thus causing a scarcity of land, still a very thoughtful citizen has devised a means of utilizing heretofore wasted space. The native of the coal region is a motorist and although with ample funds to have a garage built could not bear to see that space under his front porch stand idle, with the result that he uses now this space for the storing of his car. The illustration on this page show how the car appears under the porch. Although this shows the car facing downward, it might be well to back in the car and drive out forward.

A section of the floor of the porch 18 feet long, was cut out and stringers, of 6 by 2 inch lumber, were placed lengthwise under this section to strengthen it. Four heavy barn-door hinges were used to connect this trap door to the stationary part of the floor. When the motor car is to be run in or out, a block and tackle is used to raise the trap door. A heavy counterweight, that approximately balances the weight of the door, makes this operation comparatively easy. A padlock is used to lock the door, when it is at the down position. The costs of the alterations in the porch very small, in this particular case they were less than $10.

The Motorist's Kindergarten

EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

Systems of Final Drive

WITH the power of the motor conveyed to the change-speed gearset, where the speed of the car can be varied without changing the motor speed, we are now ready to see how this rotation of the gears is transmitted to the rear wheels to cause them to turn. The two usual ways of doing this are illustrated in Fig. 71, the upper illustration showing how the rear wheels are turned by means of chains, and the lower one showing how it is done when a shaft is used instead of the chains.

The use of chains is very common in commercial vehicles, particularly those of the heavier type. The shaft or propeller shaft, as it is called, is employed in the vast majority of passenger cars, only a very few using the chain drive at the present time.

The chain drive illustrated here is what is known as the side-chain or double-chain drive, as two chains are used which turn sprockets fastened to the rear wheels. The wheels spin around on the axle, just like on an ordinary wagon. Such an axle is called a stationary or dead axle.

Propeller Shaft Drive

In the shaft-driven cars, as will be seen from the lower illustration, the power is transmitted from the gearset to the rear wheels through a line of shafting. On the rear end of this shafting there is a small cone-shaped gear which meshes with a large cone-shaped gear on a cross shaft to which the wheels are fastened. Small gears are called pinions, while the larger ones ordinarily are called simply gears. Pinions or gears with cone-shaped faces are called bevel gears or bevel pinions, depending on their comparative sizes.

The bevel pinion and gear are used with propeller shafts to change the direction of motion. The shaft runs the long way of the car and the wheels naturally must turn on or with an axle which is across the car. It has been found that bevel gearing is one of the best ways to drive one shaft from another which is at right angles to it. Another way is by worm gear, which will be taken up later.

It will be noticed that the bevel gear is in the middle of the shaft carrying the wheels, so that to make the wheels turn the axle shaft has to turn. The wheels are fastened directly on the ends of this axle shaft so that the axle and wheels turn together. Axles which turn with the wheels are called live axles, to distinguish them from the dead type explained above.

This live axle shaft together with the bevel gears is inclosed in a housing, called the rear-axle housing. In some chain-driven cars there is only one chain instead of the two illustrated. In this case the chain is in the middle of the car and drives a sprocket in the middle of the axle. This sprocket takes the place of the bevel gear used with shaft-driven cars, but the axle is a live axle. The only difference in the single-chain drive and the shaft drive is that a chain has been used instead of a shaft and a sprocket instead of bevel gears.

Transmission by Chains

At the front end of the chain, the sprocket has to be on a shaft which is crossways of the car, so a set of bevel gears has to be used anyway. The upper portion of Fig. 71 will illustrate this. It will be seen that the short stub of shaft which sticks straight back from the gearset has a bevel pinion on it which meshes with a bevel gear on the cross shaft carrying the forward sprockets. The same arrangement is employed in the single-chain drive, except that a single sprocket is fastened to the big bevel gear and the cross shaft is not needed. This cross shaft used with the double-chain drive usually is called the jackshaft.

It will be noticed that in both the chain drive and the shaft drive illustrated, the smaller of the two bevel gears, the pinion, is on the end of the shaft which leads back to the gearset and thus to the motor. This is to give what is called the gear reduction. To explain this term, let us recall the fact that gasoline engines will not operate efficiently at too low a speed. If the rear wheels turned over at as rapid a rate as the engine must do, the car would travel too fast for easy driving on high speed and we would have to shift gears to slow down or run the risk of stalling the engine.

Gear Reduction and Gear Ratio

Of course we could get away from this difficulty by using smaller wheels—about 10 inches in diameter. This obviously is impracticable. We reduce the speed of the wheels as compared with that of the motor by making the driving bevel gear smaller than the driven bevel gear so that the former turns over several times before it has turned the latter over once. The reason for this was explained in discussing change-speed gearsets.

Ordinarily the gear reduction is between three to one and four to one; that is, the pinion rotates three or four times to each revolution of the large driven gear. When the gearset is arranged for direct drive, which is usually high speed, the motor ordinarily is connected direct to the drive shaft; that is, the drive shaft turns at the same speed as the engine. Since the bevel gear and the wheels are both attached to the same shaft, the relative speeds of the wheels and motor are the same on direct drive as the gear reduction between the bevels.

This relation between the number of times the engine turns over for each revolution of the rear wheels is called the gear ratio. On direct or high speed it usually is between three and four to one and is expressed: gear ratio, 3-1.

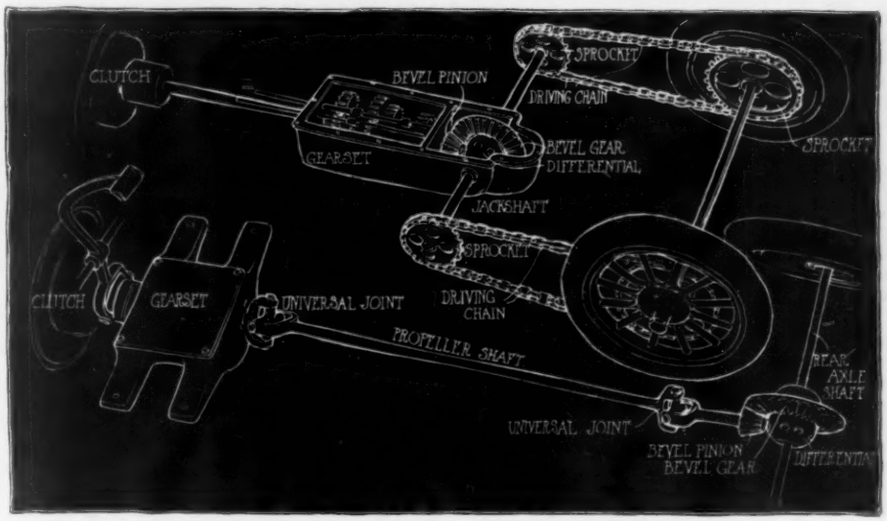


FIG. 71—EXAMPLES OF DOUBLE CHAIN AND SHAFT FINAL DRIVE SYSTEMS

From the

GOVERNORS WHO MOTOR—TRAMMEL OF FLORIDA

IT is natural that the governor of Florida, Park Trammell, should be an ardent motorist, for Florida, with its delightful climate, gorgeous scenery, miles of scenic roads and innumerable places of historic interest, is a state with an appeal, an appeal that cannot be answered satisfactorily unless you respond with a motor car. Because Governor Trammell is a booster for Florida, he is an enthusiastic motorist. Because he is an enthusiastic motorist, he favors good road legislation and works in the interests of modern Ponce de Leons who explore with gasoline and oil instead of with galleon and sword. Governr Trammell also is very democratic, and for that reason prefers to sit in the driver's seat instead of in the tonneau.

Recent Activities Among the Clubs

THE Northfield Automobile Club of Northfield, Vt., was organized at that town with twenty-five charter members a short time ago and additional members are expected in a short time. The following were elected as officers: H. S. Stone, president; C. E. Williams, vice-president; H. S. Kellogg, secretary; Dr. N. P. Wood, treasurer; E. W. Brown, Dr. A. L. Newton and S. E. Walker, board of governors.

At the recent meeting of the Nashua Automobile Club of Nashua, N. H., the following were elected: Frank E. Kittredge, president; Frederick T. Buxton, vice-president; George H. Alley, secretary; Jason E. Tolles, treasurer. Plans were made to signboard the roads leading to Nashua, and a committee was chosen to look after legislative work.

The motorists on the northern boundary between Maine and Canada have formed the St. Croix Automobile Club with headquarters in Calais, Me. The following were elected officers: W. C. H. Grimmer, president; W. N. Miner, Calais; W. H. Simonds, Woodland; F. I. Blair, St. Stephens; J. W. Graham, Milltown, vice-presidents; W. L. Cobb, Calais, secretary; C. E. Phinney, Calais, treasurer.

The York Motor Club is erecting a large garage near its club house along the Wrightsville pike, just east of the city, for the accommodation of members and visiting motorists.

The Automobile Club of Syracuse will take over the quarters of the South Bay Clubhouse Association on Oneida lake. This resort is reached over 16 miles of state road. The building is artistic and there is a complete grill equipment, screened porches for outdoor dining, a dance hall, rathskeller, etc. The Syracuse directors plan to make the resort a Mecca not only for Syracuse motorists, but for members of out-of-town clubs as well.

The Denver Motor Club now has a country home, recently taking over the Mount Morrison hotel at Mount Morrison, Colo.

An Illinois Farmers Good Roads Club was organized at a recent meeting held in Springfield by representative farmers of the state. The club will co-operate with the Illinois Highway Improvement Association in boosting good roads education and legislation. Officers for the ensuing year were elected as follows: President, George Anthony, Kewanee; vice- president, P. S. Haner, Taylorville; secretary, J. S. Culp, Bethalto; treasurer, A. J. Lovejoy, Woscoe.

SANTA MONICA DATE SET—The Santa Monica road race will be run this year on August 9. Purses amounting to $15,000, including $2,000 for any driver who may break a world's record, will be offered.

Crossing Continent in Sedan—The first attempt to cross the American continent in a closed car is now in progress. Starting from Los Angeles, J. W. Carton is now well on his way. The vehicle chosen was a Studebaker 35 sedan, a one-room body style, seating five passengers.

Day of Motor Judgment—Mayor Royal and Chief of Police Hutchison, of Harrisburg, Pa., have decided to set a side a day each week, which will be known as "Motor day." This day, according to the chief and mayor, will generally come on Wednesdays and will be for the purpose of arraigning chauffeurs who violate the city ordinance.

Kokomo Has Motor Parade—Motor car interests of Kokomo, Ind., gave a parade in that city June 10. There were 247 cars in line. There were three divisions, the first being of cars not represented by Kokomo dealers, the second for cars manufactured elsewhere but represented in Kokomo, and the third division for cars manufactured in Kokomo.

World Tour for Collegian—To celebrate the completion of his course at the University of Wisconsin, Edwin P. Kohl will leave Indianapolis July 1 for a tour around the world at the wheel of a Henderson roadster. He plans to visit every civilized country in both hemispheres before checking at San Francisco on July 1, 1915, to attend the exposition before returning to Indianapolis.

City Vehicle Tax Repealed—The South Bend, Ind., vehicle tax ordinance has been repealed by the common council, this being necessary on account of the state law recently passed by the legislature requiring a tax on motor cars. The repeal of the ordinance means that South Bend will have about $4,500 less annually for the repair of the streets. The money hereafter will be appropriated from the general fund.

Starts Cross Country Trip—E. M. Pierce, a New York millionaire lumberman, whose predilection is for motor globe-trotting and whose private office is the tonneau of his Pathfinder 40 touring car, has started on a run through the White mountains, Canada, Michigan, Indiana and Ohio in the same car which, since February, 1912, he has driven 37,000 miles. After this strenuous excursion, Mr. Pierce, accompanied by Mrs. Pierce and companion, will hit the transcontinental trail in September for southern California, where they will spend the winter.

Mexican Government Motorized—Objection has been raised to the number of motor cars kept by the Mexican government for the use of its officials. Fifty-one care are maintained at public expense at the government offices in the capital. The cars represent a total investment of $255,000. The annual maintenance charges are estimated at $232,642. This includes the salary of the chauffeur and generally a footman. Of this number twenty-two are Packards, sixteen are Protos, seven are Fiats, five are Cadillacs and one is a Buick. This is exclusive of the cars owned by the government and assigned to military work. A number of pleasure cars are used to patrol the roads of the federal district, while most of the higher officers in the field are using motor cars. While many of the latter are rented, the

Four Winds

government pays the charges as well as the costs of upkeep. Altogether the Mexican government's annual bill for motor car upkeep is over half a million dollars.

Must Slow Down at Schools—Signs, reading, "Public School—Slow Down," will be placed a short distance on each side of all Omaha schools as a warning to motorists of the danger of children running across the street.

Two-Day Meet for Seattle—Seattle will have a race meet this year for two days, July 12 and 13. Harry W. Doherty is looking after the entries and already has the promise of three cars from E. E. Hewlett. The races will doubtless be held on the mile track at The Meadows.

Enter Coast Tour—There are now twenty-one entries for the Indiana-to-the-Pacific tour to be made under the auspices of the Indiana Automobile Manufacturers' Association, and which will start from Indianapolis, July 1. The latest entries are a third Premier entry and a car entered by the Pilot Motor Car Company, Richmond.

Motor Buses For Philadelphia—The Philadelphia Rapid Transit Co. contemplates the installation of motor omnibuses on Broad and other streets not containing trackage. Broad street is approximately 20 miles long, with no transit facilities for the general public, and motor equipment will fill a long-felt need. With the exception of about three blocks it is asphalted all the way.

Motorists Make Orphans Glad—The annual outing for blind, crippled and orphan children given under the auspices of the Boston Automobile Dealers' Association took place June 11, when 1,144 youngsters and 181 attendants were taken to Nantasket beach in 250 motor cars and trucks. There were fifteen institutions represented on the outing.

Spend Millions for Motors—The latest motor car record figures in California show that during the month of May $7,596,000 was spent for machines in that state, there being 3,798 licenses issued. The May registrations were the largest in the history of the state, indicating a flourishing condition in the trade. Since May, 1905, the staggering sum of $215,396,000 has been invested in motor cars in California.

Physical Test For Drivers—A proposal has been brought before the French parliament that all candidates for a car driving license should be possessed of a medical certificate declaring that they are of sound physical constitution, and that they possess normal sight and hearing. At the present time no person is allowed to drive a motor car in France until he has undergone a practical examination in the art of handling a car. It is intended that the medical examination shall supplement the practical test.

Beware of These Daffydils!—A Hartford motorist returning from Providence reports that he was stopped by two men in the town of East Greenwich. They produced letters from the department of etymology in which it was requested that all motorists stopped treat the holders of the letters courteously. The men said that they were inspecting all cars coming from the east and passing through that section of the country for traces of the gypsy moth, which has caused considerable trouble to vegetation in Massachusetts and Rhode Island. They explained that the theory had been advanced that motor cars transported the moths from one section of the country to another. Mud on the mud guards was inspected and the seat cushions minutely examined.

Fletcher Cup Run, June 28—The Fletcher cup run, an annual fixture of the Automobile Club of Philadelphia, will take place on Saturday, June 28. Approximately 80 miles will be covered.

Hoosier Engineers Elect Officers—At a meeting of the Indiana branch of the Society of Automobile Engineers, held at the Claypool hotel, Indianapolis, on the evening of June 10, officers were elected as follows: Chairman, R. C. Combs, Prest-O-Lite company; secretary, C. P. Grimes, Wheeler & Schebler; and treasurer, John Wood, Remy Electric Co., Anderson. George A. Weidley of the Premier Motor Mfg. Co., the retiring chairman, was elected vice-chairman.

Tommy Atkins Paid Chauffeur—The Canadian government will pay the expenses of Tommy Atkin's motor rides. In preparing the military appropriation, the minister of militia has granted an allowance for motor cars that is important inasmuch as many officers will use their cars in camp this year. When specially authorized by the officer commanding the division to use their own cars in connection with staff rides or other instructional courses, and when such cars are used solely on specific military duties, officers will be entitled to a daily allowance of $8 for cars seating not fewer than three passengers. For smaller cars seating one or two passengers $5 will be allowed.

A. A. A. Directors Meet June 27—President Laurens Enos, of the American Automobile Association, has issued a call for the semi-annual meeting of the A. A. A. board of directors to be held at Philadelphia, June 27.

Motor Horn Fire Alarm—One of the most unusual fire alarms ever sounded in the city of Petersburg, Va., was that sounded by a Klaxon motor horn in a recent garage fire, when a blazing timber fell across the wires which operated the horn on a Speedwell car, started it to "honking" and awakened a policeman who called the fire department.

Bard Erects Sign-Board—Motorists who follow the New York-Boston road through the town of East Hartford on the east bank of the Connecticut river feel impelled to linger long enough at the cross roads to read a black and white sign attached to a telegraph pole underneath the road signs of the Automobile Club of Hartford. The first impression is that the sign-board is the work of a crank, but on second thought one notes in it an appeal to the better element of the motoring fraternity. The sign was erected by a resident of East Hartford and reads: "Two miles of dusty road to Hartford Center. Keep on your leather blinders till you enter, Be Fair—slow down and keep in mind, we have to eat the dust you leave behind." These lines are said to have had a good effect on those who are prone to speed over the good roads of the locality.

Brevities Concerning Good Roads Work

THE Nebraska State Automobile Association, with headquarters at Omaha, will in the future have bulletins posted relative to the condition of the roads leading out of Omaha to the north, south and west.

The Maine State Automobile Association, with a view of creating additional interest in the Pine Tree state, has just issued a most comprehensive guide and road book. It comprises 168 pages filled with information relative to the roads and where the popular resorts are and how to reach them. Pathfinding cars sent out by the association last year covered 3,000 miles gathering this information and new routes were laid covering sections of scenic interest that have been overlooked in the usual route books.

Good roads advocates, of Texas, are much interested in the proposed amendment to the state constitution which is to be voted on at an election July 19. It provides that only a majority vote of tax-payers shall be required to authorize the issuance of bonds for the construction of good roads, instead of a two-thirds vote as at present. It is considered practically certain that this amendment will be adopted.

Kenosha county, Wis., will do its share in building a connecting link to join Milwaukee and Chicago by meeting the Sheridan road and has awarded contracts for concreting the lake shore road from southern to northern limits of the county. It was necessary to open a new street and pass through a large factory building to make the lake shore road continuous along the shore, but public spirit and civic pride was stronger than financial profit and the owners of the property made no objection.

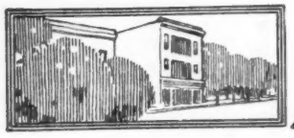
An effort is being made by the Dallas Automobile Club to secure the $30,000, which has been allotted by the federal government for road demonstration in north Texas. The club is ready to pledge the required $2 for each $1 spent by the government. The club has voted to improve and see that signs posts are erected on the portion of the Colorado-to-the-Gulf highway which passed through Dallas county.

The Pennsylvania state highway forces have started oiling the roads in the vicinity of Gettysburg in anticipation of the celebration of the semi-centennial of the battle of Gettysburg, which will be held next month. It is the intention to have about 120 miles of highway treated within the next fortnight. Every state road leading out of Gettysburg will be given attention and construction work on highways which connect York, Chambersburg and Harrisburg with the battlefield town is being hurried.

After several years of effort on the part of motor car interests and good roads' advocates, the building of a boulevard connecting Indianapolis and Noblesville is assured. The new boulevard will be more than 20 miles in length. The roadway is to be 60 feet wide and will be made of crushed stone and a bituminous binder, to the depth of 18 inches. It will be built under the direction of the county commissioners of Hamilton and Marion counties.

The Pacific highway bridge across the Lewis river at Woodland, Wash., which has just been completed, was formally opened for travel recently. The work was done jointly by Clark and Cowlitz counties with state aid and under the supervision of the state highway department. The cost was approximately $60,000. This forms an important link in the Pacific highway and eliminates one ferry in the north and south route.

Since October, 1912, upwards of 214 miles have been added to the California state highway system. Orange county recently voted road bonds in the sum of $1,270,000 and San Mateo county has incurred an indebtedness of $1,250,000 for the same purpose.



Among the Makers and Dealers

FACTORY Addition For Gramm—The Gramm Motor Truck Co., Lima, O., will begin work in the near future on a factory addition.

Haynes to Hold Convention—Officials and members of the sales force of the Haynes Automobile Co. will meet at Kokomo, Ind., Thursday, Friday and Saturday of this week for the first convention of the concern.

Rutenber Gets Halladay—The Halladay Motor Co. interests have come under the control of the Rutenber Motor Works with the result that the Halladay line will hereafter be produced by the engine makers. The factory will still remain at Streator, Ill.

War Insurance for Cars—Among other large exporters of goods the Studebaker Corp, is taking no chances on hostilities between the United States and Japan, but is placing war insurance on every shipload of motor cars it sends into the far east.

Murden Joins Knickerbocker—Herbert H. Murden, formerly superintendent of the Haynes Automobile Co., Kokomo, Ind., and Grant Motor Car Co., Cleveland, Ohio, has been appointed factory manager of the Knickerbocker Motor Truck Mfg. Co., New York.

Webster Moves to Racine—The Webster Electric Co., of Tiffin, O., is moving its plant and headquarters to Racine, and will occupy a large space in the former Racine-Sattley carriage works, which have been parceled out to various concerns since being abandoned by the carriage company. The Lavigne Gear Co. is one of the occupants of the buildings.

Stewart Corp. Retires Bonds—At a special meeting of the stockholders of the Stewart Motor Corp., maker of delivery trucks, held in Buffalo recently, the company decided to redeem the $50,000 outstanding bond issue immediately. The stockholders also voted to convert $75,000 of the $250,000 common stock into 7% cumulative preferred. Fifty thousand dollars of the preferred stock already has been issued and paid for at par. This clears the corporation of all bonded indebtedness of every sort.

Boston Show Big Success—At the annual meeting of the Boston Automobile Dealers' Association held last week the committee in charge of the show made its report showing that it was a very big success. The following officers were chosen: John H. MacAlman, president; Josiah S. Hathaway, vice president; F. A. Hinchcliffe, treasurer; Chester I. Campbell, secretary; Messrs. MacAlman, Hathaway, Hinchcliffe, F. E. Wing, J. W. Bowman, J. W. Maguire, C. E. Fay, E. A. Gilmore, and C. P. Rockwell, board of directors.

Relieving Railroad Congestion—Included in an order for $10,000,000 worth of new equipment now being received by the Atchison, Topeka and Santa Fe Railroad are 1,400 new furniture cars which will be used mainly in the motor car trade in the southwest. Between the congestion of orders at the factories and the inability of the railroad companies to put cars on the factory loading tracks promptly the dealers in Kansas have had a hard time filling orders with any sort of promptness. Probably during the wheat harvest many of these new furniture cars will be pressed into the business of moving crops and will further embarrass the dealers. But the fact that Kansas, despite recent dry weather, is going to harvest one of the largest crops in the history of the state augurs favorably for the late season demand for motors and most of the dealers will resign themselves to temporary difficulties.

Lubricant Makers Change Name—The Ohio Grease Lubricant Co., Loudonville, O., has filed papers with the secretary of state, changing its name to the Ohio Grease Co.

Kansas Business Good—In the past week five carloads of motor cars have been delivered at Topeka. Included in this number is the first Studebaker six to be sold in Kansas.

Garageman Responsible—In a recent decision the Kansas supreme court has made a ruling that the owner of a public garage is responsible for the acts of any of its employes by which damage is done to the cars of any patrons who may have left their property in charge of the concern. The case in which this decision was made was that of T. C. Roberts against the E. G. Kinley Co., keeper of a garage and repair shop. Roberts' car had been in for repairs and was being tested by a mechanic who incidentally used it to carry another patron to his home, some distance away. The car was wrecked. Judgment for Roberts, given in the lower court, was sustained by the supreme court.

Premier Increases Capital Stock—At a meeting June 11 of the stockholders of the Premier Motor Mfg. Co., action was taken which resulted in an increase of the capital stock to $1,250,000.

Building Four-Cylinder Power Plant—The Luverne Automobile Mfg. Co. of Luverne, Minn., has placed upon the market a four-cylinder unit power plant completely equipped and with electric generator and self-starter if desired.

Newark Aids Tire Company—By an agreement between the officers of the Pharis Tire and Rubber Co., which has general offices in Columbus, O., and the board of trade of Newark, O., the concern is to install $30,000 worth of new machinery at once and employ not fewer than forty men. In return the board of trade agrees to subscribe to a certain amount of the increased capitalization of the company.

Tire Company on Coast—With the buildings of the W. C. Hendrie Rubber Co. at Torrance, Cal., practically completed so far as the first unit of the $100,000 factory is concerned, June 25 has been set as the date for the making of the first Torrance tire. The Los Angeles selling agency for this product will open July 1 on Pico street. The initial installment of the Hendrie plant will handle fifty tires per day and stores will be operated in Denver, Salt Lake City, Colorado Springs, Pueblo, Phoenix and San Francisco.

Reo Adjusts Dividend System—At a recent meeting of the board of directors of the Reo Motor Car Co. of Lansing, it was unanimously voted to place the stock of the company on a 10 per cent annual dividend basis, dividends payable quarterly on July 1, October 1, January 1 and April 1, to stockholders of record at close of business on the 20th of the month preceding the above mentioned dates. All additional dividends earned and paid by the company will be treated as extra dividends. The company is capitalized at $2,000,000 and has a surplus amounting to about $2,000,000.

Russia After Business—It is declared that Russian bankers appreciate that they are losing a large volume of business through the constant fight to keep out the American cars. Business that would have amounted to many thousands of dollars has, in this way, been lost to the Russian banks. To overcome the difficulty, several of the most progressive banks of Russia have inaugurated motor car departments. It is their intentions to handle the motor business in the same manner that they have successfully handled the implement business. The large banks of Russia are represented throughout the entire Empire by branch houses. Through these branch houses they deal with the car dealer direct, disregarding the manufacturer. Practically all the retail motor car business in Europe is done on credit. The small retail dealer's funds are limited. Backed by a wealthy bank, he would be placed in a better position to handle the sale of cars, and with the backing of a wealthy bank, he would be placed in a position to do an extensive credit business. In this manner the motor car business in Russia is being established on a firmer basis, and foreign business for the American manufacturer looks very promising, it is said. The Paige-

Coming Motor Events

CONTESTS

*June 21—Cincinnati, O., hill climb.
June 20-21—Track meet, Portland, Ore.
June 23—Iowa State Automobile Association tour.
July 1—Indianapolis to Pacific coast tour; promoted by Indiana Automobile Manufacturers' Association.
July 1-16—Motor plow competition, Winnipeg, Can.
July 1-August 12—French army trials.
July 4—Track race, Columbus, O.
*July 4—Track race, Washington, D. C.
July 4—Track meet, Taylor, Tex.
July 4—Los Angeles-San Francisco road race.
*July 4-5—Track meet, Sioux City Auto Club.
*July 5-6—Road race, Tacoma, Wash.
July 12—French grand prix.
July 11-19—A. A. A. endurance run, Minneapolis to Glacier Park, Mont.
July 20—Track race, Seattle, Wash.
July 21-25—Reliability tour, Grand Rapids, Mich.
July 28-30—Galveston, Tex., beach race.
August 9—Road races at Santa Monica, Cal.
August 12—Kansas State Automobile Association endurance run to Colorado Springs.
August 29-30—Elgin road races, Chicago Automobile Club.
August 30-September 6—Reliability run, Chicago Motor Club.
September 9—Corona beach race, Cal.
September 1—Track race, Columbus, O.
September 21—French light-car road race, Boulogne.
September 25—Tourist trophy stock-car road race, Isle of Man, Great Britain.
October 4-11—Chicago Motor Club's Around Lake Michigan reliability.
*November 24—Vanderbilt road race at Savannah, Ga.
†November 27—Savannah grand prix.

MEETINGS

June 23-28—International road congress, London, Eng.

*Sanctioned by A. A. A.
†Sanctioned by A. C. A.

Shows

October 17-27—Paris show.
November 7-15—Olympia show.

Detroit Motor Car Co. recently closed arrangements with a large bank in Odessa, Russia, for the sale of its product throughout Russia.

Schachts May Build Trucks—The announcement is made that G. A. Schacht and William O. Schacht, formerly manufacturers of the Schacht cars, of Cincinnati, are looking for a site upon which to erect a plant to manufacture motor trucks.

Tire Company Changes Name—The Bayne-Subers Tire and Rubber Co., Cleveland, O., has filed papers with the secretary of state changing its name to the Subers' Fabric Co. and at the same time increasing its capital stock from $250,000 to $1,500,000.

Ford Buys Philadelphia Site—The property at the northwest corner of Broad street and Lehigh avenue, Philadelphia, having a frontage on Broad street of 370 feet, has been purchased by the Ford Motor Co. and a ten-story home will be erected on the site.

Start Work on Cole Addition—A contract has been let by the Cole Motor Car Co. for a large addition to its plant in Indianapolis and work has been started. The contract price, exclusive of machinery, etc., is $175,000. The structure will be four stories high and of brick, steel and reinforced concrete construction.

Milwaukee Motor Files Suit—The Milwaukee Motor Co., Milwaukee, has brought suit in the circuit court against Ernst G. and Elise K. Miller to collect $45,538.83, claimed to be due on stock certificates or shares accepted by the defendants at the reorganization meeting of the company on May 1. The complaint states that $37,794.50 has been paid on the certificates.

Crown in Temporary Quarters—The Crown Motor Car Co., Louisville, Ky., maker of the Crown, has moved into temporary quarters at 121 North Third street. C. H. Lambert, secretary and treasurer, of the company, announces that the factory will turn out 1,000 machines during the next 3 months. The 1914 announcement will be made about September 1 and during the following year the Crown people expect to make 50,000 cars. According to Mr. Lambert, the output for several years has been sold to the Partin Mfg. Co., of Chicago, which will be the general distributor of the Louisville-made car. Whether the permanent plant of the Crown company will be located in Louisville has not yet been decided.

Zener Leaves Premier Factory—Otto Fink, who has been with the company a number of years, has been made assistant superintendent of the plant of the Premier Motor Mfg. Co., Indianapolis, succeeding Robert Zener, who has resigned to engage in the real estate business.

Speedway Lots on Market—Within a few days an important step toward the further development of Speedway, the horseless city near Indianapolis, will be taken, when the Globe Realty Co. will open an addition of 600 residence lots. The company is now laying water and gas mains and building sidewalks. The Prest-O-Lite company already has located in the new city and the Miami Cycle and Mfg. Co. is about to erect a large plant. The Globe Realty Co. is one of the numerous enterprises in which Carl G. Fisher and James A. Allison are interested.

Invents Wheel-Assembling Machine—Carl D. Fisher, Jr., Wapakeneta, O., is the inventor of a machine which he claims will expedite the assembling of motor car wheels by means of air pressure. The machine weighs 12,000 pounds and has been thoroughly tested, according to the inventor.

Cole Forms Police Bureau—As a result of the activity of motor car thieves all over the country the Cole Motor Co. has added to its national selling organization a department to be know as a bureau of information to assist in the recovery of stolen Cole cars. J. D. Riker has been appointed as head of the bureau.

Timken to Enlarge Plant—Officers of the Timken Roller Bearings Co., of Canton, Ohio, announces that they will erect an addition this summer which will provide for the employment of 200 additional men. Plans for the buildings have not been prepared and will not be commenced until negotiations for additional land are concluded. The company, however, will try to have the plant completed by fall.

Schacht Forms New Company—The G. A. Schacht Motor Car Co. has been incorporated with $25,000 capital by Gustave A. Schacht and Charles Talbott. The company will manufacture motor trucks only. Temporary headquarters have been secured on Spring Grove avenue, Cincinnati, O., near the plant of the Schacht Motor Car Co., of which Gustave Schacht was the former president. The old company is now running under the hands of a receiver.

Name Columbus Buggy Managers—Thaddeus C. Dunlap, civil engineer, and George W. Lattimer, a druggist, of Columbus, have been named by the creditors' committee of the Columbus Buggy Co. to have charge of the management of the plant. The creditors' committee recently took over the plant from the receiver, who was discharged. According to the two managers, every effort will be made to save the plant for Columbus. It is the intention of the managers to continue the manufacture of both gasoline and electric cars for the present at least. Other plans will be announced later.

Recent Incorporations

Bayport, N. Y.—William L. Mantha Co., capital stock $1,000; to deal in motor cars; incorporators, W. Westerbeke, W. L. Mantha, N. F. Mantha.

Bellefonte Automobile Mfg. Co., to manufacture six cylinder cars; incorporators, W. P. Sieg, E. A. Parrish.

Brooklyn, N. Y.—Brooklyn Auto Repair Co., capital stock, $5,000; incorporators, L. N. Vause, H. P. Freece, C. V. Mulligan.

Chicago—Divine Motor Car Co., capital stock, $10,000; to manufacture motor vehicles; incorporators, E. C. Divine, H. E. Campbell, W. R. Mitchell.

Chicago—Chicago Universal Motor Truck Co., capital stock, $10,000; incorporators, E. C. Rockwell, J. H. Dunn, C. M. Stevens.

Cincinnati, O.—G. A. Schacht Motor & Truck Co., capital stock, $35,000; to manufacture and deal in motor cars; incorporators, G. Schacht, W. Schacht, C. R. Talbott, T. C. Jung, M. L. Buchwalter.

Cincinnati, O.—Motor Sales & Service Co., capital stock, $5,000; to conduct motor car business; incorporators, J. B. Minor, G. B. Jolly, C. Lehmann, A. Magoewska, W. W. Helmholtz.

Cleveland, O.—Lake Shore Auto Cartage Co., capital stock, $5,000; cartage and storage business; incorporators, C. M. Handy, C. Malouf, G. J. Klamm, J. Nelisse, L. B. Handy.

Columbus, O.—Commercial Auto Body & Mfg. Co., capital stock, $50,000; to manufacture bodies, parts and accessories; incorporators, M. E. McManus, G. H. Krippenberg, F. L. Fuller, J. H. Orgill, J. E. Matthews.

Haverhill, Mass.—Mansur Motor Truck Co., capital stock, $30,000; incorporators, G. B. Mansur, K. L. Moses, N. L. Furbush.

Indianapolis, Ind.—American Automobile Exchange, capital stock, $25,000; to deal in motor cars; incorporators, W. Wynant, I. R. Like, E. C. Brennan.

Jacksonville, Fla.—Southern Tire & Supply Co., capital stock, $12,000; incorporators, H. E. Perryman, S. Dunlap, C. E. Brown.

New York—Century Garage Corp., capital stock, $1,000; incorporators, M. Lampert, A. R. Martin, A. M. Martin.

New York—Bemis Car Truck Co., capital stock, $150,000; incorporator, C. A. Mattfeld.

New York—Drenco Garage Co., capital stock, $10,000; incorporators, D. W. Driscoll, J. A. Rennie, C. Coon.

New York—Insular Service Corp., capital stock, $50,000; to deal in motor cars; incorporators, F. H. Cox, T. Kirby, A. E. Carpenter.

New York—Convent Garage Co., capital stock, $5,000; incorporators, E. F. Dannemann, H. F. Dannemann, W. G. Dannemann.

New York—A & N Gas Engine Starter Co., capital stock, $1,000; incorporators, E. C. Allison, H. B. Newins, I. M. Higbee.

Port Chester, N. Y.—A. B. C. Automobile Co., capital stock, $1,000; incorporators, W. D. Sporberg, W. F. Gainey, T. F. J. Connelly.

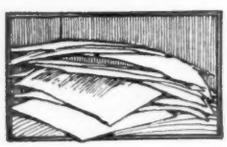
Red Springs, N. C.—Red Springs Motor Co., capital stock, $10,000; incorporators, J. J. Thrower, W. Jones and others.

Richmond, Va.—Alsop Motor Co., capital stock, $20,000; incorporators, J. B. Alsop, C. Armentrout, M. S. Alsop.

Richmond, Va.—Grant Garage Corp., capital stock, $10,000; director, F. W. H. Bell.

Texarkana ,Tex.—Purified Gasoline & Oil Co., capital stock, $60,000.

A 1907 Reo runabout has been converted into a mammoth lawn mower by the Quincy Country Club at Quincy, Ill., with which the grass on its golf ground is now cut in less than one-sixth of the time and at less than one-fifth of the cost at which it was formerly done. The two-passenger body and rear system of this runabout are retained intact while the front is supported by a triple-armed frame which converges down to the axle running through an iron roller 2 feet in diameter and 4 feet long across the chassis frame. A 3-foot mower is attached in front of this roller and another at the left side of the car. These two mowers cut a swath 6 feet wide, which, with the nominal speed of 6 miles per hour, would mean 11 acres per day of 8 hours. Assuming that the cost of gasoline is 20 cents and oil 50 cents per gallon and the driver is paid $3 per day, the cost per acre would be less than 35 cents.



Brief Business Announcements

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Car
Baltimore, Md.	Gilbert A. Wehr	Reo
Lamartine, Wis.	S. E. McCumber & Son	Detroiter
Lamartine, Wis.	S. E. McCumber & Son	Marathon
Milwaukee, Wis.	White Automobile Co.	White
Philadelphia, Pa.	Peerless Motor Car Co.	Rauch & Lang
Racine, Wis.	Foster and Weichert	Reo
Seattle, Wash.	C. R. Williams	Empire
St. Louis, Mo.	T. J. Moss	Standard
Vancouver, B. C.	Dominion Motor Car Co.	Hudson

COMMERCIAL CARS

Australia	Richardson, Orr & Co.	Koehler
Erie, Pa.	American Motor Sales Co.	Koehler
Green Bay, Wis.	Snavely Transfer Co.	Koehler
Hartford, Conn.	H. E. Putnam	Blair
Le Roy, N. Y.	Thomas Watson	Koehler
Pittsburgh, Pa.	Klinger Co.	Koehler
Seattle, Wash.	C. R. Williams	Star
Seattle, Wash.	Imperial Sales Co.	Lincoln
St. Louis, Mo.	Cabany Motor Car Co.	Knox-Martin
Tacoma, Wash.	American Auto Co.	Stewart
Taunton, Mass.	S. & M. Co.	Koehler

TOLEDO, O.—Manager Thomas J. Harris has opened up the Knight Rubber Co. salesroom on Madison avenue.

Columbus, Ohio—Fred C. Atcheson has opened a new garage and repair shop on South Water street near Broad street.

Winnipeg, Can.—W. N. Macneil, formerly local manager for one of the largest tire companies, has organized the Excelsior Rubber and Supply Co.

Lisbon, Ohio—L. H. Miller is making preparations to open a garage and salesroom in the Miller block on North Park avenue and expects to be ready for business within 2 weeks.

Boston, Mass.—F. A. Calderwood, formerly assistant manager of the Lozier branch in Boston, Mass., resigned recently and has joined the sales force of the Boston branch of the Locomobile Co.

St. Louis, Mo.—A. E. Archer, for several years manager of the northwestern branch of the Columbus Buggy Co. at Minneapolis, has taken over the Ohio electric agency for St. Louis and vicinity with salesrooms at 5023-5029 Delmar boulevard.

Providence, R. I.—The American Locomotive Co. has decided to open salesrooms for its cars and trucks at Providence, and A. G. Williams, of New York, has been put in charge of the branch. It was formerly an agency handled by Frank J. McCaw.

Toledo, O.—The City Tire Repair Co. is the name of a new concern opened up by Edwin A. Middleton, formerly with the Acme Rubber Co. The shop is a repair and vulcanizing establishment and is situated on the ground floor of the Meredith building.

Toledo, Ohio—The Babcock Garage Co. is a new Toledo concern incorporated with a capital stock of $10,000. The incorporators are Assistant City Attorney Alonzo C. Duer, C. Wagenhausen, L. P. Wagenhausen. The new company takes charge of a plant already in operation on Erie street near Monroe.

Boston, Mass.—I. W. Penniman, for some time in charge of the sales department of the Walpole Tire Co.'s branch in Boston, has been promoted to general manager of the territory to succeed E. P. Weber, who resigned recently. Mr. Penniman for some years was manager of the Portland, Me., branch of the Goodyear Tire and Rubber Co.

Topeka, Kan.—A new partnership which will be known as the Herreshoff Motor Co. of Kansas has been formed by Frank Short and A. C. Longren of Topeka. Mr. Short formerly handled the Jackson, Auburn and Rambler under the name of the J-A-R Motor Co. Mr. Longren has been associated in the Topeka Motor Car Co., in which he retains an interest. The new firm has dropped the Auburn agency, but retains the other two cars mentioned.

Philadelphia, Pa.—J. Milton Lutz has been appointed receiver of the Automobile Service Association, Inc.

Minneapolis, Minn.—O. W. Klose, district manager for the Maxwell Motor Car Co. in Minneapolis has resigned and will go into business for himself.

Manitowoc, Wis.—The garage and motor car repair business formerly run by L. F. Splitt at 1205 Washington street has been purchased by Ullius and Bernstein of Milwaukee.

Columbus, Ohio—The Clintonville Garage and Auto Co. is the name of a new garage and repair shop opened at Oakland avenue and High street. The concern has taken the local agency for the Crown and Crow cars.

Cincinnati, O.—At a recent meeting of the Cincinnati Automobile Dealers' Association the following officers were elected: Harry S. Leyman, president; George Behlen, vice-president; E. A. Kruse, secretary, and W. G. Welbeon, treasurer. The Queen City dealers are now busy arranging for their annual hill-climb June 21.

Buffalo, N. Y.—Alleging infringements upon patents covering a gasoline engine starting device, Francis G. Crone, of Buffalo, has begun action in the United States district court against Edward J. Bihl and William Bihl, co-partners in the Cycle, Auto and Supply Co. here. Crone asks for an injunction and an accounting of profits.

Boston, Mass.—The Pope-Hartford Co. of Boston and the Republic Motor Co. of Massachusetts, the latter handling the Little and Chevrolet cars, have new service stations in Cambridge, the former adding a new building to its present one and the other company leasing 10,000 square feet in the Shoe and Leather building.

Lamartine, Wis.—S. E. McCumber & Son, which has been engaged in business at Lamartine for 40 years, have opened a new fireproof garage, salesroom and repair building, giving Lamartine its first modern garage. E. N. McCumber is manager of the garage department. The company will represent the Marathon and Detroiter.

Indianapolis, Ind.—Under the name of the Auto Sales Co., Joseph H. Hawkins has opened a sales room at 20 West Wabash street, for second-hand cars. This is the third clearing house in the city which handles second-hand cars exclusively. The American Automobile Exchange recently was organized and incorporated with a capitalization of $25,000 by Wilbur Wyant, W. R. Luke and E. C. Brennan, to conduct a similar business. The Indianapolis Automobile Clearing House has been in business for some time.

Baltimore, Md.—Henri Eierman, formerly in charge of the sales of the Metallurgique cars in New York city, has joined the Schall-Crouch Co., Lozier agent here.

Milwaukee, Wis.—The Milwaukee Forge and Machine Co., capital $8,000, has been incorporated by George B. Pillar, Arthur W. Peffer, John Eckert and Charles Hartson.

Brocton, Mass.—George F. Howe and Wilbert L. Aller, who have been in business together for some years as the Brockton Garage Co., have dissolved partnership. Mr. Aller will continue the motor establishment.

Conshohocken, Pa.—The Lee Tire and Rubber Co. announces the appointment of the following distributors: MacBride & Klein, Boston, Mass.; E. M. Henderson, Cincinnati, Ohio; George E. Goble & Co., Detroit, Mich.; Texas Auto Supply Co., Fort Worth, Tex.; Motor Car Supply Co., San Antonio, Tex.; and Waco Auto Supply Co., Waco, Texas.

St. Louis, Mo.—The Brown Automobile Co., for several years the local representative of the Peerless Motor Car Co., has been absorbed by the Peerless Motor Car Sales Co. Oscar Stroh is president of the new company and F. G. Weaver is secretary, treasurer and manager, positions he has held for eleven years with the Brown and Peerless companies.

Boston, Mass.—The Knox of Springfield, Mass., is now represented in Boston by a branch instead of by an agency as formerly. A. P. Underhill, who has handled the car for many years, having gone to California to manage a railroad property each summer. Frank Crockett has been made manager of the branch. Salesrooms will be continued at the old stand on Boylston street.

Manitowoc, Wis.—L. J. Anderson of Manitowoc, Wis., who recently erected a large building for garage, warehouse and sales purposes, has organized the L. J. Anderson Co., with a capital stock of $20,000, to conduct the business. The company deals in farm machinery, gasoline engines and motor cars, tractors, and similar prime movers. Agency lines have not been selected as yet.

Milwaukee, Wis.—The garage of the Kopmeier Motor Car Co. of Milwaukee, considered the largest in the northwest, and situated at 375-389 Summit avenue, has been leased for a long term of years by Hustis Bros., 137 Oneida street, Milwaukee, representing the Stevens-Duryea and Borland electric. Some time ago reports were circulated that the Kopmeiers, being desirous of retiring from the motor car field and devote their attention to their extensive ice

and cartage interests, had leased the big garage to August A. Jones, Cadillac representative, but the deal was not completed.

New York—George H. Duck has resigned his position as general service manager of the American Locomotive Co., to take effect July 1.

Chicago—The local branch of the Kellogg Mfg. Co., of Rochester, N. Y., manufacturer of the Kellogg air pump, has been moved to 1112 Michigan avenue.

Buffalo, N. Y.—The Tire Sales Co. has opened salesrooms at 931 Main street. A. Greenbaum, formerly connected with the Baltimore branch of this concern, has been appointed to handle tires in Buffalo.

Schenectady, N. Y.—A departure that will prove of benefit to car owners is the establishment of service stations by the General Electric Co. all over the country where electric lamps may be readily obtained.

Fostoria, Ohio—Harry Nestlerode has taken over the garage business in Fostoria, formerly conducted under the name of Nestlerode Bros. Charles Nestlerode will retire from the motor business. The concern is agent for the Oakland.

Bridgeport, Conn.—The Welding Co., an abbreviation of the incorporated name of the Autogenous Welding Equipment Co., which has been carrying on successful job welding businesses in Springfield, Boston, Hartford and Holyoke, has recently added to its line of shops by commencing business at 303 Center street.

New York—The Bosch Magneto Co. announces the opening of the following supply stations during the month of May: S. S. Parmalee Co., Macon, Ga.; Lackawanna Automobile Co., Scranton, Pa.; Armstrong Auto Co., St. Joseph, Mo.; Electric Mfg. Co., St. Paul, Minn.; Edwards & Dickey, Portsmouth, N. H.; Susquehanna Motor Car Co., Wilkes-Barre, Pa.; John F. Esser, Flushing, N. Y.; Spokane Cycle and Supply Co., Spokane, Wash.

Indianapolis, Ind.—A sales branch for the J-M. Shock Absorber Co. has been opened at 425 North Meridian street, with M. Matthews as manager.

Marietta, Ohio—The Pioneer Motor Car Co. will soon start the erection of a garage on lower Front street. The structure will be three stories high and of concrete.

Coshocton, O.—The work of remodeling and repairing the Third Street Garage, recently gutted by fire, has begun. Fire walls will be built to protect the garage in the future.

Portsmouth, N. H.—Edwards and Dickey, proprietors of the Rockingham garage on Vaughan street, with C. E. Hoyt, has purchased the Beacham garage business and will conduct both places under one management.

Indianapolis, Ind.—W. Reese Parker, a salesman for motor cars, has filed an involuntary petition in bankruptcy in the federal court at Indianapolis. His assets are $195 and his liabilities $51,978.46, of which $48,600 represents indorsement on notes for others.

Milwaukee, Wis.—The B. and M. Mfg. Co. has been organized at Milwaukee and incorporated with a capital stock of $10,000 to manufacture and market a spark indicator and intensifier. Charles D. Bremer, John L. Mooney and William C. Lund are the owners of the company.

Boston, Mass.—The last lot of land on Commonwealth avenue, Boston, between the buildings occupied by motor concerns and the parkway that was vacant has been sold and upon it will be erected salesrooms and service stations, one of which will be occupied by the Whitten-Gilmore Co., that handles the Chalmers line in Boston, as well as the Federal and Standard trucks and the Woods electric, and the other is said to be leased to the Franklin agency.

Portland, Ore.—Fred B. Norman, formerly with the Ford Motor Car Co. in Seattle, has been appointed manager of the Portland Ford branch.

Hartford, Conn.—The Hartford Foundry Co. is in receiver's hands, Edward C. Frisbie having been appointed temporary receiver. The appointment was made on application of the Charter Oak National Bank which holds notes for $27,000.

Toledo, O.—A new tire concern, known as the Knight Rubber Co., has been opened by Thomas J. Harris at 810 Madison avenue in the New Thatcher building. The company will distribute Knight tires throughout northwestern Ohio, conduct a repair and vulcanizing plant and carry a stock of tire accessories and tubes.

Tomahawk, Wis.—Foss & Moyer are about to open their new garage, a concrete and brick structure measuring 50 by 125 feet and two stories high. The garage will be conducted under the name of Tomahawk garage. G. A. Foss and Wm. Moyer are the owners.

Racine, Wis.—W. A. Simanek, foreman of the pattern shop of the Mitchell-Lewis Motor Co., Racine, and D. A. Cooper, foreman of the Rambler pattern shop at Kenosha, Wis., has resigned and formed a partnership under the style of Racine Pattern Works. A shop has been established at Racine.

Portland, Ore.—The first meeting of the newly organized Portland Automobile Trade Association was held during last week, at which thirty-seven dealers were present. H. L. Keats, H. M. Covey and Merrill Moores were appointed a committee to investigate the second-hand car problem. The plan of the association is to have the value of all used cars definitely settled.

The Motorists' Bookman

Spain Revisited

PICTURESQUE Galicia must be the motorist's paradise. At least such an assumption is verified by the following description of a motor ride from Vigo to Mondariz by C. Gasquoine Hartley (Mrs. Walter M. Gallichan), the author of this entertaining book of travel:

> It is one of the anomalies of Galicia that motor cars have in many districts preceded railways. The cars we travelled in were of great power, built by English, French, Spanish and Bohemian makers. I was in a Hotchkiss, which could, and did on a straight road, travel 60 miles an hour. There is no speed limit in Galicia. The first mile or so of road was level and we travelled at a great speed. How we escaped the slow, patient oxen, which now and then met us on the road, or the dogs that continually rushed out from houses upon the way, I do not know. I only know that we never stopped. As we rushed onward, the vague outline of objects to our right and left flitted past us with phantasmagorial rapidity. At first we were frightened; but I noticed that our chauffeur never lost his splendid calm. He avoided all objects with a skill that really was extraordinary; he smiled, he talked to us, giving us much information and his views upon things, and confirming what he said with proverbs, which he communicated gravely as if they were sayings of his own; and he smoked cigarets incessantly. Never in my life have I seen such perfect control. I have forgotten to mention a small chico who rode upon the step of the car. It was his duty to look out along the road, to sound the hooter, and also to right any small thing that from time to time went wrong. Despite the velocity at which we travelled, he climbed about the car with the agility of a young monkey, tightening a screw, wiping the glass before the driver whenever it became dimmed, altering one of the blinds—it was wonderful what that chico was able to do.

Although the author is fascinated with Spain and its people, it would be unjust to discredit all of her delightful impressions as prejudiced and after reading "Spain Revisited," one is prompted to ship his car immediately to Galicia where speed laws are unknown and where romance and beauty are linked with the history of bygone centuries. The book is embellished with fifty or more half-tone illustrations. It is from the press of James Potts & Co., New York.

Motor Car Construction

In a book entitled "Motor Car Construction" by R. W. A. Brewer, the novice will find a number of very interesting chapters, especially the opening chapter on the history of the internal combustion engine. The scope of the book is not large and the illustrations few, the author in a sense tending to criticise rather than describe various forms of construction. For the student who is just merging into the technical side of the motor car the book is of advantage. D. Van Nostrand Co., New York, is the publisher of the work.

Through South America

To the motorist who finds pleasure in touring over historic trails and highways rich with legends, the roads of the republics of South America are recommended by Harry W. Van Dyke, the author of this interesting book of travel with an introduction by John Barrett, director-general of the Pan American Union. At least the perusal of "Through South America" should awaken in such a person a desire to roam over the continent where the cities have the architectural beauty of Paris, where the scenery is as inspiring as that of Switzerland and where a century of progress is linked with a century of conquest. Especially fascinating is Mr. Van Dyke's opening chapter in which he writes of the triumphs of discoverers, conquistadors and liberators. Each of the following eleven chapters is devoted to descriptions of the individual countries—Brazil, Argentina, Uruguay, Paraguay, Bolivia, Chile, Peru, Ecuador, Colombia, Venezuela and the Guianas—their cities, mineral and agricultural resources, scenic splendor and the customs of their people. "Through South America" is one of the most recent volumes in the Illustrated Books of Travel series published by the Thomas W. Crowell Co., New York and sells for $2 net.

The Accessory Corner

Temco Drill and Emery Wheel

PORTABLE electric tools have become as much of a necessity to motorists and garagemen as motor cars themselves, for much of the work which the factory ordinarily would do is done now either by the local garageman or by the owner himself. The Temco Electric Motor Co., Leipsic, O., is offering a number of portable electric tools, one of the most important being a combination drill and emery wheel. This unique tool is illustrated in Fig 1, and its usefulness is evident when it is brought to mind that it requires very little time to attach and detach the emery wheel or drill.

Of course the drill is used in places where the ordinary form of drill cannot be used, such as for working under the car. The emery wheel attachment is a feature, for the drill which is used may be sharpened on the emery wheel. Thus the repairman working on the car may sharpen the drill without walking the length of the garage to the stationary emery wheel.

By the attachment of the proper tool the Temco instrument may be used also as a valve grinder.

Edison Rectifier

Charging batteries from an alternating current circuit by means of a rectifier always has been a drawback to use of batteries, because the correcting device requires so much attention. The electric vehicle has suffered much because of the lack of knowledge regarding the proper charging of batteries, and each year sees a number of new devices which are claimed to be simple and automatic in their work of changing alternating to direct current. The latest to the field of simple instruments is Thomas A. Edison, the Menlo Park wizard. His device is being manufactured by Thomas A. Edison, Inc., Orange, N. J., and many claims are made for its simplicity and efficiency. The most important claim made thus far comes to us in the result of a test in which the rectifier was made to operate for 4,000 continuous hours without adjustment. This test is equivalent to operating the rectifier for a few years in ordinary charging service. In Fig. 6 is shown the Edison rectifier with the controller and ammeter in the circuit. The device is, in reality, a simple electro-magnetic valve, which permits current waves of but one polarity to pass through it. By a simple means the storage battery is prevented from discharging through the rectifier.

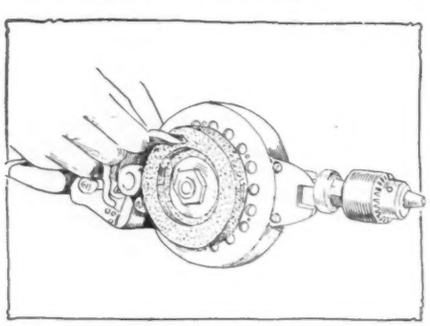


FIG. 1—TEMCO DRILL AND EMERY WHEEL
The drills which are used may be sharpened by the same machine in a few minutes

Walker Quadruplex Carbureter

Two carbureters in one, and employing a special single intake manifold, constitute the Walker kerosene carbureter. The feature of this means of volatizing fuel is the fact that either gasoline or kerosene may be used whenever desired, the controlling mechanism being attached to the steering post of the motor car. The carbureter, shown in Fig. 2, is manufactured by the O. S. W. Co., Worcester, Mass.

As will be noticed, there are two carbureters, A and B, attached to a special form of manifold. One of these carbureters handles gasoline and the other kerosene or other low-grade fuel. The gasoline system remains independent of the other, a separate fuel tank being employed to feed it. It is suggested that a compartment in the kerosene tank may be set aside to hold gasoline and thus save space.

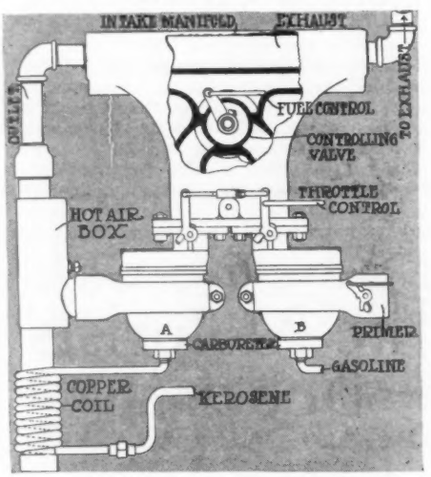


FIG. 2—WALKER LOW-GRADE FUEL CARBURETER
Note the two carbureters using the one manifold. One handles gasoline, the other kerosene or alcohol

Heat for the proper vaporization of the kerosene is obtained from the exhaust of the engine, a portion of this exhaust being deflected through a passage in the intake manifold. The fuel is heated a number of times before it reaches, ultimately, the cylinder of the motor; once by means of the heat of the exhaust passing through a copper coil, as shown in the illustration, again by means of the hot air generated in the hot-air box, next by means of the hot water circulating around the passage to the control levers, and lastly, the main part of the intake manifold is heated to any desired degree by the deflection of a certain amount of the exhaust gas.

In operation either gasoline or kerosene may be used whenever desired. For example, the motor is started on gasoline and after the car has gotten under way and the motor sufficiently hot to use kerosene, the gasoline supply is discontinued by moving a lever on the steering. As soon as it becomes necessary to use gasoline again the kerosene supply may be cut off.

The method of installing the Walker carbureter varies with the different makes of motors, those having intake and exhaust on the same side being better adapted to deliver the desired heat than the T-head motor, which has the headers on opposite sides. In either case a special intake pipe is necessary. This pipe is made with a cored passage from end to end to convey the deflected exhaust gas. The maker states that the carbureter will handle also denatured alcohol. Tests were conducted by the maker, in which a 30-horsepower car was operated at 5⅛ cents per mile. In this and other tests no smoke appeared at the exhaust and no trouble was experienced with spark plugs becoming sooted or cylinders being carbonized.

Triplex Spark Plug

Instead of having one spark gap, the Triplex plug, manufactured by the Charles R. Bates Co., New York, has three spark gaps through which the current passes, and the maker claims that this form of spark plug gives a continuous flame from one end of the plug to the other. The lower end view of the Triplex plug is shown in Fig. 3. The current from the magneto or battery passes down the center electrode and across gap No. 1 to a T-head conductor, A.

This conductor is insulated in the porcelain. After jumping gap No. 1 the current flows through the conductor A and across gap No. 2 to the conductor B, then through this conductor and across gap No. 3 to the shell wire, which is grounded. Thus there are three distinct sparks oc-

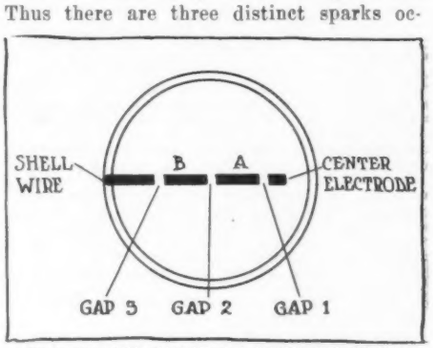


FIG. 3—END VIEW OF TRIPLEX PLUG
The spark is made to jump three gaps instead of one as in the ordinary plug

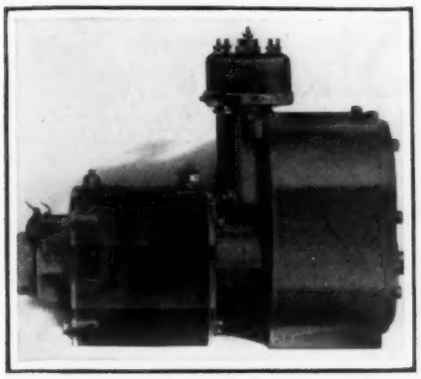


FIG. 4—BAILEY TRIPLE SYSTEM
The machine is a unit for generating current for lighting, starting and ignition. It has a maximum output of 15 amperes and supplies current at a normal pressure of 6 volts

curring in three different places at the same time, which condition is said to produce a more perfect combustion of the gas in the cylinder, which not only gives a saving in fuel, but more power for the fuel consumed. This is getting at the fuel question from an unusual angle.

Keromix

A device which permits a motor to run on a mixture of gasoline and kerosene is being offered by F. W. Patterson, Inc., Chicago. The apparatus consists of a spray nozzle and automatic air valve, a mixer and a priming tank. The mixer appears as a flange which is inserted between the flanges of the carbureter and intake manifold. The mixer is connected with the automatic air valve. The attachment of the Keromix requires no holes to be drilled and the average owner may insert the device in a short time. According to the manufacturer a car using 1 gallon of fuel for 16 miles will, with the Keromix obtain 24 miles. The selling price is $15.00 for any size car.

Portable Motor Driven Pump

A tire pump for garages which may be pushed from place to place is being offered by the Westinghouse Electric Mfg. Co., Pittsburgh. This company makes only the electric motor, the pump being manufactured by the Brunner Mfg. Co., Utica, N. Y. A platform on four wheels supports the air tank and fastened to and above the air tank is the motor and air compressor. The motor is of ½ horsepower and may be operated from an ordinary lighting circuit. A pressure gauge, 12 feet of air hose and an automatic tire connection are part of the equipment. A feature of the device is the fact that the automatic connection shuts off the air when the valve is removed from the tire.

Hydraulic Gasoline Storage

There are at present a number of concerns manufacturing safety fuel tanks, among them being the Hydraulic Oil Storage and Engineering Co., Detroit, Mich. This company is marketing a system which makes use of water. It is known that water and gasoline are not miscible, and also that water is heavier than gasoline, the ratio between the weights of these being as 17 is to 12. The Detroit-made storage system is illustrated in Fig. 5; and, as will be noticed, consists of a gasoline tank with various connections underneath which lead indirectly to the city water pipe.

To prevent explosions, which occur usually from the spontaneous combustion of a vapor above the gasoline itself, the maker of this device has used clever means. Knowing that combustion cannot take place except in the presence of air, or oxygen, the manufacturer decided to exclude all air from the storage tank, and as the gasoline is used, thus offering a space, this space is filled up immediately with water.

It will be noticed that there is a float box in the illustration. Water is passed first through this box, through the piping to that part marked as the leg. It travels then up this leg to the storage tank and fills it. The water continues further almost to the gasoline drain. When it gets to this point the float in the float box shuts off the water supply. The entire system is almost full with water, and now is ready to receive gasoline. The water control valve is opened first, which permits all water in the gasoline pipe above the valve level to run into the tank. This displacement forces water out through the pipe marked drain. By pouring gasoline through the filler the water in the tank is displaced, and this water runs out through the drain. Thus as the gasoline is poured into the tank water leaves the tank in equal proportions. This means that the tank is full always with a combination of water and gasoline, the latter floating over the water. To discharge gasoline water is permitted to enter the tank. This pushes the gasoline upward and out through the gasoline draw-off.

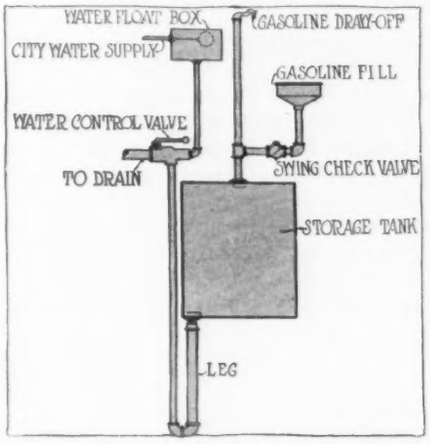


FIG. 5—HYDRAULIC GASOLINE STORAGE
The principle upon which this system is dependent for perfect operation is that of floating gasoline over water

Bailey Electric System

Combination lighting, starting and ignition systems, or triple systems as they are called, already are flooding the market. Such a system was designed and built originally by Benjamin F. Bailey, professor of electrical engineering at the University of Michigan, with a view to making a triple system which would weigh little, be flexible in its output and at the same time be simple enough to be handled by the average motorist. From the statements and tests made by the maker and from the description of the apparatus, the purposes of the inventor have been accomplished. The company manufacturing the Bailey systems is known as the Bailey Electric Co., Grand Rapids, Mich., and its lighting, starting and ignition generator is shown in Fig. 4.

At a normal running speed of the car of 25 miles per hour this instrument will produce 15 amperes at 6 volts when operating as a dynamo. According to the maker, it is capable of spinning a four-cylinder motor of 3¾-inch bore and 4½-inch stroke and with 75 pounds compression at a speed of 120 revolutions per minute. The instrument shown in Fig. 4 is the entire unit, the use of an outside motor not being necessary, for the motor is incorporated in the device shown. This is 15½ inches long and weighs 55 pounds. Another feature of the Bailey unit is the 60-degree range of spark advance, which should make for engine flexibility.

FIG. 6—NEW EDISON RECTIFIER
A simple apparatus for changing alternating current to direct by the turning of a switch. The owner of batteries may charge them without fear of charging rate varying

Tail-Light Alarm

The American Electric Co., Chicago, is offering a unique device which, when installed on a tail lamp burning oil, will notify the driver of the vehicle when his tail light is out. In some cities a heavy fine is imposed if a motor car is upon the street at night without a burning tail light, but with the American tail-light alarm the driver is warned either by buzzer or bell, as desired, just when the light goes out. The buzzer or bell does not stop signaling until the lamp is lighted again. The device works upon the thermostatic principle. As soon as the flame of the lamp goes out, a rod previously opening a circuit is now made to close a circuit due to the heat being taken away from it. The closing of the circuit operates a bell or buzzer by a battery.

The Motor Car Repair Shop

THERE recently appeared in this department an article on tire chain abuse which was misleading in that it was written by a European correspondent, and while possibly applying to European conditions, many of the statements made therein would not hold as applied to American roads and streets. One statement which may have given a false impression was that while chains should be carried they should not be used on hard pavements. Anyone who has endeavored to traverse the asphalt streets of some of our cities on a wet day realizes that chains are necessary if progress is to be made with safety. Chains are almost indispensible to prevent skidding on slippery pavements.

The suggestion in the article referred to that metal-studded tires be used, is in line with foreign practice, but is impracticable here, where there are few on the market. Another statement which might have been misinterpreted was in regard to the wear due to chains "in a comparatively short distance of travel." Further reading of the article develops the fact that the comparatively short distance was a 36-hour run in a tour through Sweden. Too hurried editing is responsible for not stating clearly that European conditions alone were under consideration in the article.

Lining Up Connecting Rods

It sometimes occurs that through some error in fitting the connecting rod bearings of a motor, the piston will not line-up properly with the walls of the cylinder; this causes excessive and uneven wear of the cylinder and piston, and in time may give rise to all sorts of troubles due to the escape of oil and gases past the piston. In most cases of this kind, if the crocked position of the piston is sufficiently great, overheating will occur from the excessive friction.

After a motor has been run, however, for some time with a crocked piston, if the motor were to be dis-assembled, an examination of the piston would show unusual marks of wear perhaps as at points P and P1, Fig. 2.

Conditions of this kind are brought

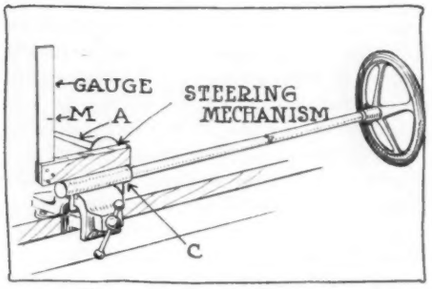


FIG. 1—GAUGE FOR TESTING RANGE OF A STEERING ARM

Lining Up Connecting Rods

about when a repairman neglects to see that the pistons, line up, or set at absolute right angles, to the crankshaft, before replacing the cylinders. Many shops are provided with special gauges for testing the alignment of pistons, whilst others depend upon the use of a try-square, which is rested on the top of the crankcase so that its perpendicular arm can be arranged alongside of the piston to show whether or not it lines up properly. If the piston sets perpendicular to the face of the crankcase, it should also line up with the cylinder walls.

When a piston has been found to occupy a position of misalignment when tested with the try-square or other instrument, it is customary to bend the connecting rod a trifle to bring the piston into alignment. There are several ways of doing this, one of which is shown in Fig. 2. This method consists simply in using the vise to bend the rod with the aid of three pieces S of ½-inch square iron arranged as illustrated. These pieces are bent at right angles so that they will hang on the jaws of the vise while arranging the rod in place.

This method, of course, necessitates the removal of the rod from the crankshaft and perhaps the piston from the rod, therefore, it is practical only in connection with jigs or tools specially provided to test the alignment of the rod bearings before the rods are assembled on the crankshaft.

To bend a rod without removing it, the ordinary bending-rod, such as is shown at B, Fig. 2, sometimes can be employed. Some repairmen place a block across the face of the crankcase at the side of the piston, then raise the piston to the top of its stroke, and with the block as a fulcrum, a lever is used under the edge of the piston to pry it upward and thereby bend the rod. This latter operation is a very delicate one, however, and should not be attempted by an unskilled amateur.

Gauge For Steering Arm Adjustment.

In Fig. 1 is shown a gauge such as is employed in a large motor bus repair shop to test the throw, or range of movement of a steering arm. The steering mechanism of a motor car often is provided with an adjustment by means of which the throw of the arm is regulated. Often this regulation cannot be made conveniently, while the mechanism is assembled on the car, hence the use of a gauge of this character. Unless properly regulated, one is apt to find that the wheels may be turned in one direction until the tires rub against the frame, the

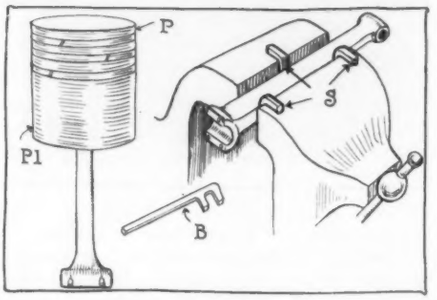


FIG. 2—WEAR ON CROCKED PISTON AND METHOD OF LINING UP ROD

springs, or the drag-link of the steering gear, whilst too much clearance, will be found on the opposite side of the car. This condition though it may enable a car to turn in a very narrow street in one direction, in the opposite direction a turn cannot be made even in a reasonably wide street without considerable see-sawing back and forth.

This feature of a steering gear always should be adjusted so that as short a turn may be made in one direction as in another, and to secure this adjustment the tool shown in Fig. 1 is found very useful. It is designed to rest on the cylindrical portion C of the steering mechanism as illustrated, so that when the steering wheel is turned as far as possible in one direction the steering arm A will register with a mark M on the vertical arm of the gauge.

Parts Cleaning With Soda Water

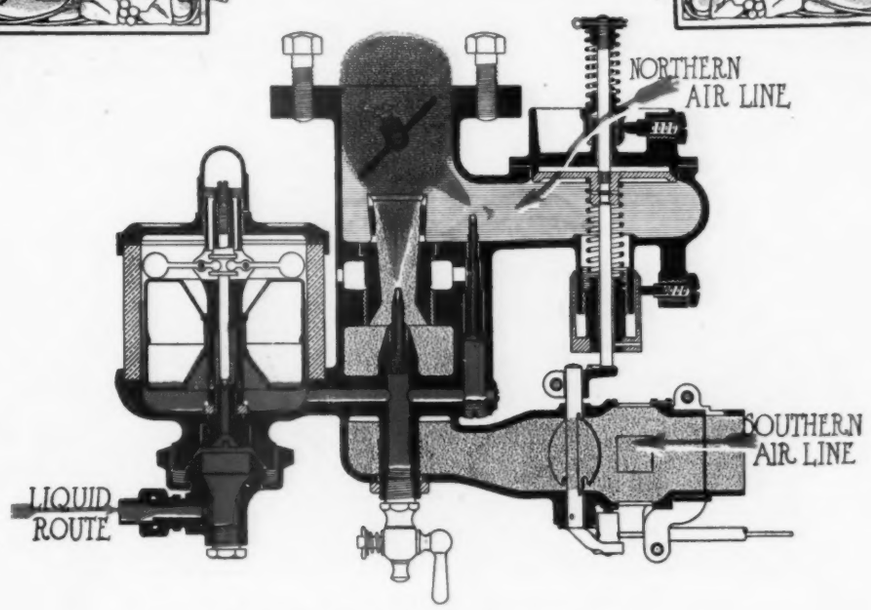
By the use of hot soda water for the cleaning of metal parts, the use of much gasoline can be avoided in repair shops. The process not only is cheaper than the gasoline method, but the parts are more thoroughly cleaned and the danger of fire is minimized. If the process were generally adopted by the industry, a considerable saving would be effected in the total consumption of gasoline, which could be diverted to use as fuel for driving.

All of the cleaning in the assembly departments of the Pierce-Arrow Motor Car Co. is done by the soda process. The system is described in detail as follows, by J. Willard Lord, of the service department. The outfit includes two tanks, one containing the soda solution and the other water. These are heated by steam coils.

In operation the soda tank is supplied with about 25 pounds of soda a week. If the work for 3 or 4 days happens to be of a very oily nature, it is found that a certain amount of oil and scum will collect on top of the water, which is an immediate indication that the soda solution is weak, and which is easily remedied by the addition of a few pounds of soda.

LITTLE JOURNEYS

With a Drop of Gasoline through the New Type "G" STROMBERG CARBURETOR



An outline map of the routes we are to travel.

A CARBURETOR, to many motorists, is nothing but a tin can with a college education. Like lamps and a tool kit, it comes with a car, and that is all there is to it. Who makes it, and how, gives the ordinary motorist little concern.

The motor fan who grows oratorical over the special features of his radiator cap, and can give you 57 reasons why wire wheels are superior to wood, starts in "missing" as soon as you ask him how his carburetor differs from the one Jones has. Intimate that a carburetor is the clearing house for from $250 to $400 worth of gasoline in a year, and that possibly it may have been the cause of making his upkeep a simple proposition in aviation—and the chances are that you have told him something he had never thought about. Bring to his attention that a carburetor may, like a dollar watch, be a good investment for the money. Tell him you notice that he is not wearing a dollar watch, and he will get your point.

All of which is by way of packing up preparatory to a series of Little Journeys with a drop of gasoline through The STROMBERG NEW TYPE "G" CARBURETOR—for the instruction of whomsoever cares to travel. Facts brought out will be pocket-book facts, which may prove of everlasting benefit to your checking account, and your motoring pleasure.

OUR ITINERARY. Our first Little Journey will be via the Liquid Route. We will follow the course liquid gasoline travels from the fuel tank, up through the needle valve, into the STROMBERG float chamber, and thence to the twin gasoline geysers or spray nozzles before joining forces with either regular or auxiliary air.

Our second Little Journey will be via the Southern or Tropical Air Line. We follow the course of the regular air through the STROMBERG TYPE "G" CARBURETOR, noting the means by which it becomes incorporated with the undiluted gas drawn from the spray nozzles, producing the so-called "prime mixture."

Our third Little Journey will be via the Northern Air Line. We follow the course of the auxiliary air through the STROMBERG TYPE "G," noting the means by which it is churned in with the "prime mixture," producing the "firing" or "definitive" mixture ready for the manifold.

Next Week We Shall Take Our First Little Journey

Stromberg Motor Devices Company

54 East 25th Street, Chicago, Illinois

Holder of World's Stock Championship

National

Holds Fastest 500-Mile Record in Competition

REPRINT FROM CHICAGO RECORD-HERALD

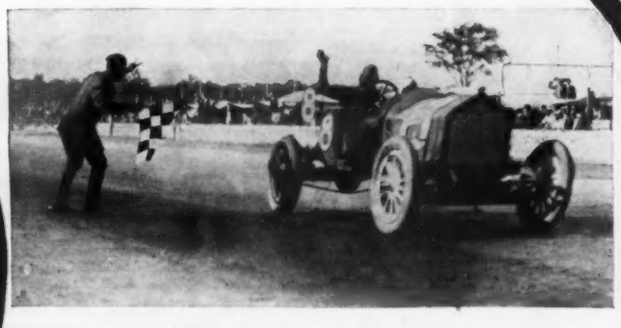
RECORD STANDS, THANKS TO GOUX

Wiry Frenchman to Take All Speedway Trophies to France, But Leaves Mark Behind

BY ALLEN C. RANKIN.

IN A FEW DAYS a wiry little Frenchman, Goux by name, will sail to his home in France, carrying with him $20,000 in hard-earned United States money, but Goux and his Peugeot will leave the one thing for which many prayed—the record.

In accomplishing his wonderful feat of winning all the money in sight, together with the trophies, Goux left to the American people the record, which they cherish above everything else. Joe Dawson's mark of 78.7 miles per hour will remain for other drivers to shoot at and make future designers to build cars so that the men they send to the front will be able to lower it.



The one and only American-made car that remains superior to all foreign cars in demonstrations of speed, power and reliability in the 500-mile races

National . . 6:21:06, winner in 1912
Fiat. . . . . 6:31:29, second in 1912
Peugeot. . . 6:35:05, winner in 1913
(*The National was not entered in 1913*)

NATIONAL, 78.72 miles per hour (1912 winner)

1913 winner, 75.92 miles per hour.

1911 winner, 74.61 miles per hour.

Others may come and go, but the National continues to lead all the world. This has significance to you. For years and years the National has maintained its superior quality, a perfection in materials, design and construction that sets the standards.

Others may imitate the National's beautiful and stately appearance, but its reliability and efficiency are above counterfeit.

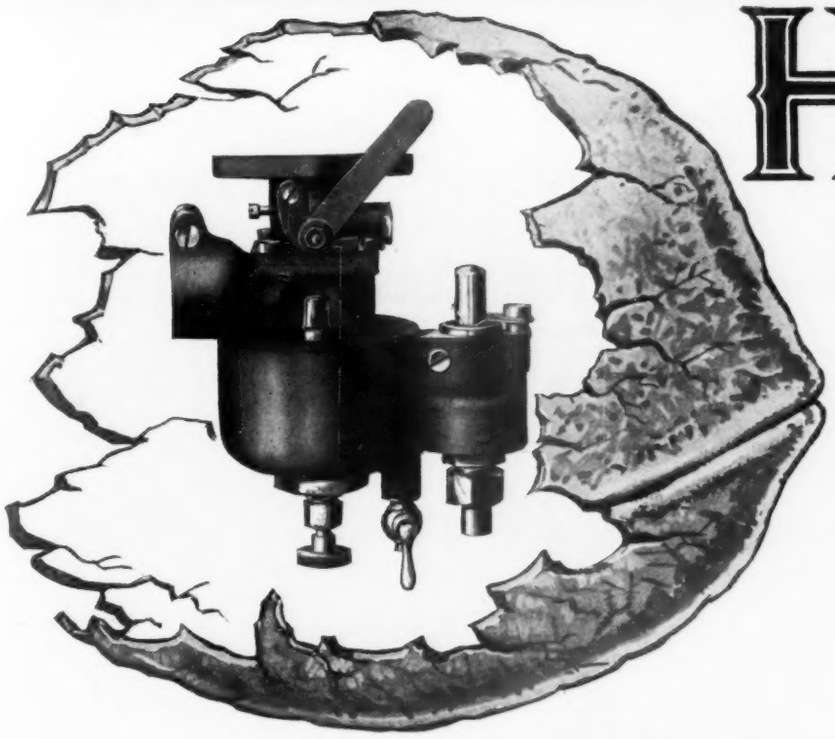
Convenience, Safety and Comfort

Nothing could be more simple—and no car is more reliable than the National. You need make no effort—everything needed in operating the car is within comfortable reach. The entire mastery of this powerful car is under your immediate control. A woman or a child may drive this car just as easily as a man. Electric starter, positive steering, electric lights, reliable brakes, access to both front doors, left side drive and center control—and a flexible motor that makes frequent shifting of gears unnecessary.

Immediate Delivery

Five Models, $2750 to $3400

National Motor Vehicle Company
Indianapolis, Ind.



HOLLEY CARBURETOR

"No Moving Parts"
"Only One Adjustment"

"The Whole Story in a Nut Shell"

Over 53% of all the gasoline motor cars manufactured in the United States during 1913 will be Equipped with this new self-adjusting Holley.

HOLLEY BROTHERS CO., 131-141 Rowena St., Detroit

AUTOMOBILE SUPPLY CO......1335 Michigan Boulevard, Chicago, Ill. **OMAHA RUBBER CO.**.....Omaha, Neb.
FOREIGN BRANCH: Holley Bros. Co., Coventry, England

Holley Carburetors are carried in stock at the following addresses: **CHAS. E. MILLER, Home Office:** 97-103 Reade St. and 121 Chambers St., **New York.**

BRANCHES:

New York City.....924 Eighth Ave. Between 54th and 55th Sts.
New York City.....2782 Broadway Between 107th and 108th Sts.
Springfield, Mass.....Bridge and Dwight Sts.
Hartford, Conn.....274 Trumbull St.
Atlanta, Ga.....66 Edgewood Ave.
Brooklyn, N. Y......1421 Bedford Ave.
Buffalo, N. Y......824 Main St.
Albany, N. Y......135 Central Ave.
Boston, Mass.....202-204 Columbus Ave.
Detroit, Mich......227-229 Jefferson Ave.
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Philadelphia, Pa......318 North Broad St.
New Orleans, La......601-603 Baronne St.
Newark, N. J......274 Halsey St.

When Writing to Advertisers, Please Mention Motor Age.

June twelfth
1 9 1 3

Mr. Advertising Manager,
Motortown, U. S. A.

Dear Sir:-

Openness to conviction is bred by experience.

The farther we go, the more we learn to value the judgment of others.

When the combined judgment of advertisers in the automobile industry gives two publications out of many an overwhelming preference, this verdict must have great weight with every man who wants his advertising dollar to do him the most good.

Will the shrewd advertiser care to disregard the lesson conveyed by the facts printed on the page opposite?

Or will he be guided in his selection of advertising media by the combined judgment of advertisers in his own field — a judgment that places The Automobile and Motor Age so far in the lead that there is no second?

Very truly yours,

Francis L. Wurzburg

FLW/EC Manager Advertising Department.

You are paying for someone's vulcanizer every time you have a tire repaired.

Your vulcanizer?—
or the *Repairman's*

Are You Getting your money's worth?

One or two per cent of the price you pay for a tire repair covers the cost of material used. Part of the rest goes to pay for the vulcanizer that did the job. What's left just goes from your pocket into the repairman's till.

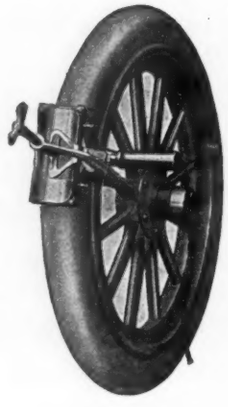
Why don't you get your own tire repair profits?

You or your chauffeur can do it with a

SHALER Vulcanizer

It's actually easier and quicker to vulcanize a puncture or cut yourself than try to fix it any other way. Not only is the Shaler Vulcanizer the simplest tire repair outfit, but the Shaler method of tire repairing is something that anyone can master in a few minutes' time. The illustrated book on vulcanizing furnished with each Shaler takes up every detail of the process in plain, clear language. You can't make mistakes if you simply follow the instructions in it.

Tube repairs,—punctures, splices, tears, —are easy. Think of the saving you will make on this item alone. There's no use of paying seventy-five cents every time you pick up a nail. You can make the repair at once at a cost of two or three cents. Your tire is in ***your*** garage all the time too, and ready to run as soon as the repair is finished.



Let us put you on to something else You can hardly go a mile without picking up some kind of a tire injury, a cut, chip or tear. It doesn't take long for some of these cuts to gather up mud and dirt and grind them into the fabric, rotting it until a blowout occurs. Then you're out $50.00 for a new tire.

Now, unless you have a vulcanizer of your own, these cuts will never get any attention. They don't look important enough to turn over to the garage man for repair. With your own vulcanizer, all that's necessary is to prepare the cut, clamp the vulcanizer on the inflated tire (see illustration) and leave it there to work by itself for a few minutes. The automatic heat control takes charge while the vulcanizer is working, saving your time for other work about the car, and preventing all chance of danger to your tires.

But, be sure you have a Shaler Vulcanizer. The automatic heat control, the all important feature in vulcanizing, is exclusive with the Shaler.

No matter whether you are interested in vulcanizing or not, you ought to have a copy of our "Care and Repair of Tires." It tells in an interesting way about all of the approved devices and methods for increasing tire mileage. Has been quoted as authority by both American and Foreign trade papers.

One copy FREE if you ask for it while the edition lasts.

C. A. Shaler Co., 224 4th St., Waupun, Wis.

RAYFIELD

CARBURETOR

The Real Joy in Driving an Automobile Lies in the Flexibility of the Motor

The Flexibility of the Motor Depends Absolutely Upon the Efficiency of the Carburetor

Whether a car wins a race, breaks a world record, annexes an economy trophy or leads the field home in an endurance run, the real efficiency of the motor depends upon the carburetor.

The Rayfield Carburetor has in the last two years broken more records in more different fields of competition than any other carburetor made. Does this mean anything to you?

It means just this: Until a carburetor meets practically and positively the exacting requirements of **every day service** it cannot be supreme on the contest field.

The Rayfield is not a racing carburetor. However, it is capable of racing speed when it is called for.

It was designed for consistent economical carburetion; to fill the 365-day-in-the-year want of the automobile man.

It is for the man who is looking for unflagging utility.

It is for use on the commercial car, where persistent, dogged truck service means money.

Our real pride lies in the economy tests in which the Rayfield is supreme.

Not economy at a certain speed as is characteristic of most carburetors, but economy at every point in the speed range.

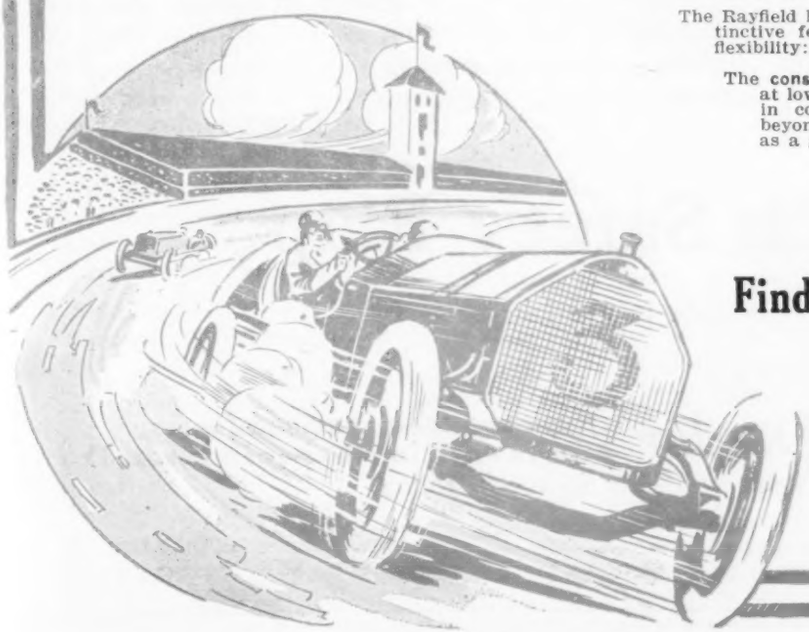
Not economy at the sacrifice of power—not economy at the sacrifice of speed—but real economy under all driving conditions.

More than that—low grade gasoline carburetes just as effectively in a Rayfield as gasoline of the highest quality.

It is a well-known fact that there are more heat units in low test gasoline, but it takes less gas and more air to make it explosive—that's why so many carburetors are falling down in these days of low-grade gasoline, and the Rayfield meets these conditions.

The Rayfield has three separate air intakes—these are distinctive features in the Rayfield, and herein lies its flexibility:

The **constant air opening** which furnishes all the air at low speed, the **mechanical valve** which operates in conjunction with the throttle when opened beyond the ¼ point and the **automatic** which acts as a governor.



We only ask that you investigate the Rayfield Mechanical Construction further.

Findeisen & Kropf Mfg. Co.
21st and Rockwell Streets
Chicago, Illinois

BRANCHES
1140 Michigan Ave.....CHICAGO
1902 Broadway.....NEW YORK
987 Woodward Ave.....DETROIT

World-wide leadership in Lubrication

Coreans delivering our lubricants.

East Indians at our Calcutta Warehouse.

Chinese delivering our lubricants in Shanghai.

Some of our employes in Japan.

Loading our lubricants on Ceylon Island

Among the thousands who are using and handling Gargoyle Mobiloils every day, there are few who fully realize how extensive are the operations of the company which makes these oils.

The Vacuum Oil Company's activities cover the world.

From Stockholm to Cape Town, from New York to Shanghai, the lubricating counsel of this company is sought by engineers who must meet the most rigid efficiency standards.

Every conceivable lubricating problem is placed before us for solution, and practically every class of machinery in existence is lubricated by our lubricants.

We are depended upon to determine the requirements and to supply the oils that meet them.

Lubrication with us is both a business and a profession.

We not only manufacture and sell lubricants, but we also give our clients the benefit of our professional knowledge and experience.

To establish a sound guide to correct lubrication we have taken a step of the utmost importance to the motorist.

Each year we analyze the motor of each make of automobile and issue a lubricating chart.

This chart is a complete guide to correct automobile lubrication.

It shows at a glance exactly what grade of Gargoyle Mobiloil is correct for each of more than 400 different automobiles, including pleasure and commercial vehicles. It does not stop at the makes of cars. It goes further, giving the correct grade of oil for each model of every make, from 1908 to 1913 inclusive.

To such thoroughness, applied to all lubricating problems, is due our leadership in the field of lubrication.

Our Gargoyle Mobiloils are the result of years of specialized experience in scientific lubrication.

Every problem that must be met to secure maximum efficiency has been taken into consideration in the manufacture of these oils.

The lubricating chart referred to above represents our professional advice.

If you use an oil of less-correct "body" or of lower lubricating efficiency than that specified, your motor faces unnecessary friction and ultimate serious damage.

The various grades of Gargoyle Mobiloil refined and filtered to remove free carbon, are: **Gargoyle Mobiloil "A," Gargoyle Mobiloil "B," Gargoyle Mobiloil "D," Gargoyle Mobiloil "E," Gargoyle Mobiloil "Arctic."**

They are put up in 1 and 5 gallon ***sealed cans***, in half-barrels and barrels. ***All are branded with the Gargoyle, which is our mark of manufacture.*** They can be secured from all reliable garages, automobile supply stores, and others who supply lubricants.

GARGOYLE

Mobiloil

A grade for each type of motor

VACUUM OIL CO.
Rochester, U. S. A.

BRANCHES:

NEW YORK, 29 Broadway
CHICAGO, Fisher Bldg.
DETROIT, Ford Bldg.
PHILADELPHIA, 4th & Chestnut Sts.
BOSTON, 49 Federal St.
INDIANAPOLIS, Indiana Pythian Bldg.

Distributing warehouses in the principal cities of the world.

SHELDON AXLES

Sheldon Equipments Received Perfect Scores

Last month a gruelling 4-day reliability run was conducted by the Washington Post. Not a road or technical penalty was imposed on any of the trucks which were equipped with SHELDON foundations of Springs, Axles, Brakes and Jackshafts for trouble with these parts. At the finish every washer, bolt, nut and cotter was in its original position—exactly as it left the starting line.

The wisdom of the manufacturers of the above trucks in equipping them with SHELDON foundations of Axles, Brakes, Jackshafts and Springs was proved by this reliability run, which was witnessed by representatives of the government.

SHELDON products are actual sales-helps.

SHELDON AXLE CO. Wilkes-Barre, Pa.

Chicago Office	Detroit Office	San Francisco Office
68 East 12th Street	1215 Woodward Ave.	444 Market Street

Advertisement for Bids for Furnishing Motor Vehicle Tags for 1914 Registration

Notice is hereby given that proposals for furnishing to the State of North Dakota fifteen thousand (15,000) automobile tags with duplicates and one thousand (1,000) motorcycle tags with duplicates—with such additional tags and duplicates as may be required during the year 1914—will be received at the office of Thomas Hall, Secretary of State, at the Capitol, in the city of Bismarck, North Dakota, until two o'clock p. m., on the 9th day of August, 1913.

Tags must conform in size and form with the provisions of Section 10, Chapter 6, Session Laws of 1911.

Numerals and letters are to be as provided by law, to be so spaced to give a good general appearance and as may be more specifically designated in contract or as shown by sketch.

Each automobile tag shall be furnished with a 3/16-inch round hole at each corner and also slots near the margin of the plate, top and bottom, just inside of each corner hole, or four holes and four slots to each plate. It is to be preferred that these slots are to be so constructed or protected to prevent cutting or injuring the hanger straps. Tags must be rounded at the corners. The tags shall be made of black charcoal or Bessemer steel of not heavier than 20 gauge or lighter than 30 gauge, with the necessary figures and letters enameled or embossed, or both, on same. The design is to be such as to provide sufficient rigidity.

There shall be a marked contrast between the color of the plates and the color of the letters and figures thereon; such colors to be designated by the Secretary of State.

Tags are to be packed in heavy envelopes ready for mailing. Two plates of the same number are to be in each envelope with proper packing, if any is needed, to prevent damage in shipment to final destination, and also to be packed as lightly as is consistent with safety in order to save postage and express.

The envelope is to bear the following printed return card, "From Thomas Hall, Secretary of State, Bismarck, North Dakota," and to be numbered or stenciled with the same number that tags enclosed in said envelope bear. The tags so enclosed as above to be delivered packed in substantial crates, each crate to contain 50 sets of tags consecutively numbered and properly packed in numerical order. On the packing sheet used between the tags in each envelope there shall be printed instructions to owners the copy for which is to be supplied by the Secretary of State.

Tags shall be delivered F. O. B. Capitol Building at Bismarck as follows:

First one thousand automobile tags and five hundred motor cycle tags not later than December 10th, 1913.

Three thousand automobile tags and one thousand motor cycle tags not later than February 10th, 1914, and the whole number not later than April 10, 1914.

Payment for the tags to be made as follows:

For first shipment on March 1st, 1914; second shipment on April 15th, 1914, and the remainder to be paid for in three equal installments to be made May 15th, June 15th and July 15th, 1914.

All tags ordered by the Secretary of State, except those for which a definite date of delivery is herein specified, shall be delivered at such time and in such quantities as the Secretary of State may direct.

The right to purchase tags in the open market is hereby specifically reserved. Such right may be exercised in the event of failure upon the part of contractor to furnish the necessary number of tags as and when ordered, the difference in cost of such tags and necessary expense incident to securing them, to be charged to contractor, and such amount may be deducted from any amount then due the said contractor or recovered under his bond.

All tags must be finished in a thorough and workmanlike manner and the right is reserved to reject any tags for defective material or workmanship. The contractor must agree to refinish or replace without expense any tags that fail under ordinary usage during the term of the contract.

Bidders are required to furnish samples of work and to specify in detail the metal proposed to be used and weight of completed tags.

Each bidder is requested to name price per pair for tags specified and also price per pair for additional tags and duplicate tags.

Each bid must be accompanied with a certified check for the sum of $100.00 made payable to Thomas Hall, Secretary of State, as a guarantee that the bidder will carry out the terms and conditions of the contract if same is awarded to him.

The right to reject any and all bids is hereby reserved. All bids must be sealed and marked "Bid for furnishing motor vehicle tags" and addressed to,

THOMAS HALL,
Secretary of State, Bismarck, N. D.

$1950 F. O. B. Factory

Completely Equipped

The Car of

Dreadnought Moline

Unfailing Service

The Dollar Test

Thousands of cars are sold every year because they are cheap. With such cars we have no quarrel, they are wonderful values—at their price.

But we maintain that price should not be the basis upon which motor cars should be bought and sold—or made.

We build the best car that we can build and ask only a legitimate margin of profit on each one. The dollar test does not enter into our plans at all.

Nor should it be considered too highly by the man who buys a car assuming, of course, his own ability to pay enough to buy a car for its durability, its comfort, its unfailing service, and its record.

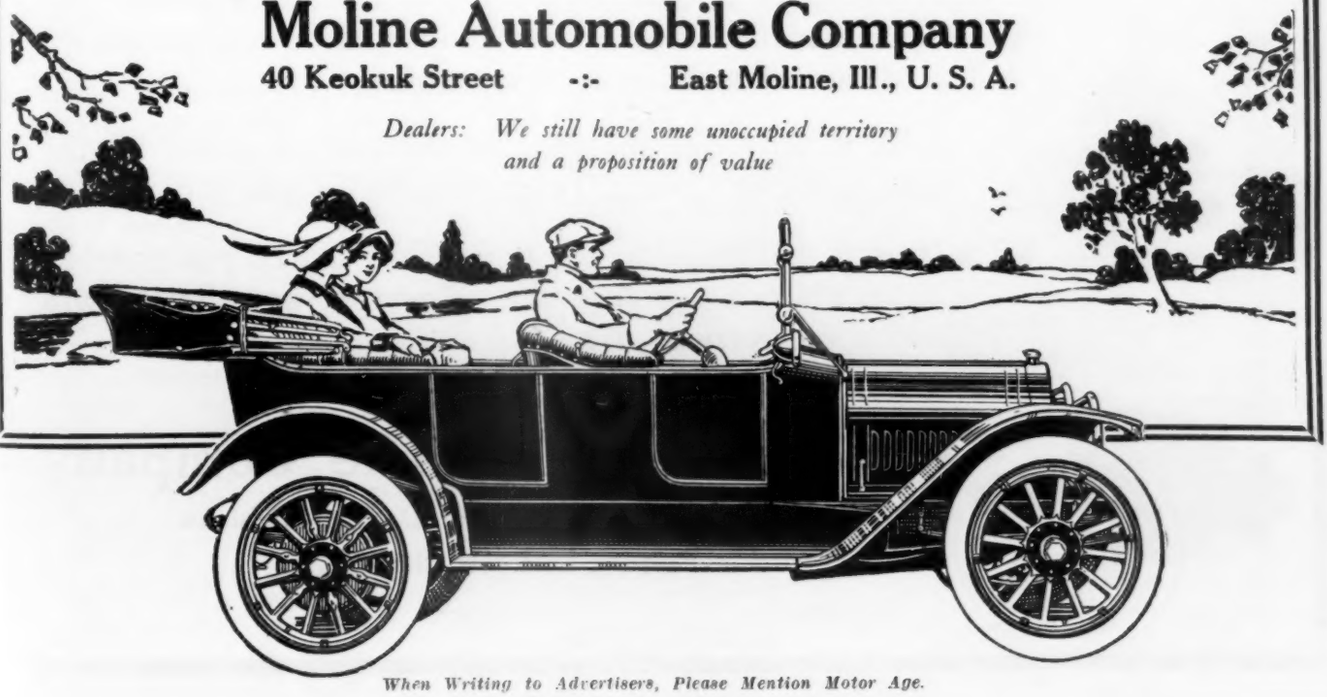
If you ever ride in a Dreadnought Moline, if you ever drive one you will understand at once why we claim that this superb car, more than any other, will give you a greater degree of all around satisfaction—a perfect harmony of convenience, comfort, power, reliability and beauty.

Send us your name and we will put you in touch with our nearest dealer.

Moline Automobile Company

40 Keokuk Street -:- East Moline, Ill., U. S. A.

Dealers: We still have some unoccupied territory and a proposition of value



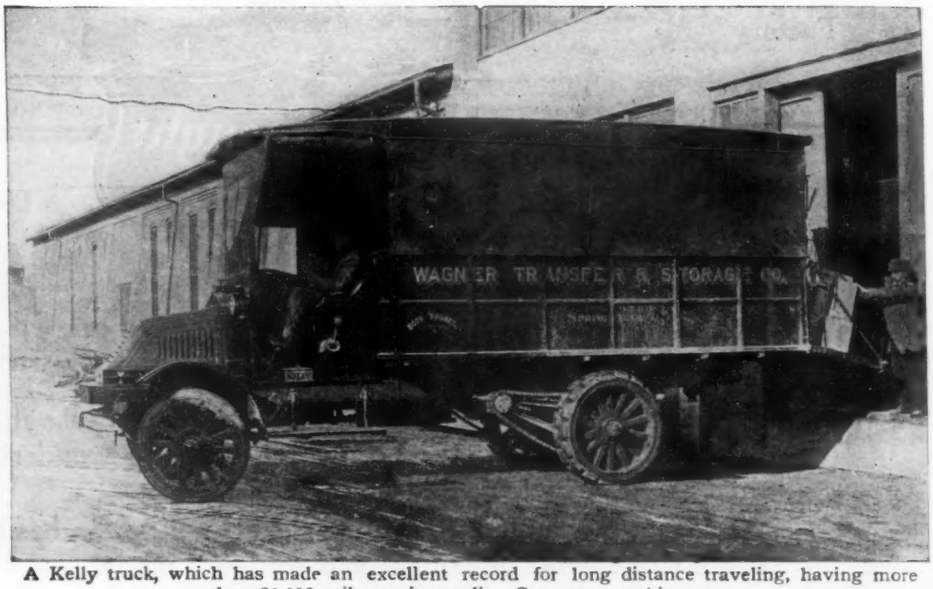
interest we can only hope that the law makers heeded the advice of those who are in the best position to understand just what such legistation would mean to a most important industry.

Kelly-Springfield Record.

Of historical interest to the American industry is the three-ton Kelly truck pictured on this page, which has traveled more than 21,000 miles and according to the owner is still going strong. This chassis contains one of the first water cooled engines built by the Kelly-Springfield Motor Truck Co., of Springfield, Ohio. Before it was sold to its present owner it was put through a strenuous factory and road test, aggregating 18,000 miles. It was then taken down and, the builders tell us, there was not the slightest sign of wear visible anywhere. The truck was then reassembled and sold to the Wagner Company, in whose service it has covered 3,000 miles more.

Ajax Not to Drop Mileage Guarantee.

In response to many inquiries the Ajax-Grieb Rubber Company recently announced.



A Kelly truck, which has made an excellent record for long distance traveling, having more than 21,000 miles to its credit. See note on this page.

The following manufacturers include them as **Regular Equipment:**

Abbott-Detroit
Chandler Six
Hupmobile
Columbia-Knight
Howard-Six
Hudson
Keeton
Knox
Lexington
Lozier
Luverne
Maxwell
Oakland
Pilot
R-C-H
Studebaker
Speedwell

Standard for 1914

Pierce-Arrow
Tribune
Paige-Detroit

Optional

Cutting
Franklin
Haynes
Ohio
Packard
Stevens-Duryea
White
Winton
Warren

Jiffy Curtains are now the Recognized Standard Type of Automobile Side Curtains. They Fit Any Car.

You can have them on your car if you insist.

They are much more convenient than the old type of side curtain.

They are always ready—can be let down or put up in a "jiffy."

They permit occupants of the car to enter or leave it easily.

They allow unlimited vision in all directions.

They can be folded up and easily stored away in the top out of the way, ready for instant use.

They do not in any way interfere with the raising or lowering of top.

Full information as to their construction, method of attachment and price furnished on application.

Read What These Owners Say

"For convenience and protection I consider 'Jiffy' curtains far superior to anything else I have yet seen. We also use them on our twelve trucks."

"'Jiffy' curtains are certainly fine. By their use I can in a few minutes, without leaving my seat, convert my touring car into a storm proof, frost proof limousine."

"Since using 'Jiffy' curtains I have become so accustomed to their convenience that I would not part with them for twice what I paid."

"I was going to buy a limousine for winter use, but since getting my touring car 'Jiffyquipt' don't need it."

"A set of 'Jiffy' curtains certainly came in handy last evening when a sudden rain storm came up and I had my 'Jiffy' curtains up without getting out of my car. They are not only protection against the rain, but answer the purpose of a limousine body, and you can always get out of the door readily by sliding them."

Manufacturers' Comments

"We consider 'Jiffy' curtains the most practical on the market, and they have helped our business more than anything else we have handled."

"We believe the time is not far distant when 'Jiffy' curtains will be the universal standard equipment."

"The additional appearance with plenty of light, no nuisance of broken lights, and an entirely closed and tight fitting top which guarantees comfort to the occupants of 'Jiffyquipt' cars cannot be too highly praised."

MANUFACTURERS

Our royalty license proposition, enabling you to equip your car with Jiffy Curtains especially designed for it, should interest you.

It has interested many of your competitors.

Jiffy Auto Curtain Co.

GENERAL SALES OFFICE

DETROIT MICHIGAN

527-528 Ford Building

Top and Curtain Makers

Thousands of car-owners will welcome the chance to equip their present car with Jiffy Curtains.

Our royalty license proposition enables you to fill this demand profitably.

Stewart
Delivery Trucks

Panel Body Type—Capacity, 1,500 lbs. Price, $1,650 (chassis). Other bodies to suit all businesses.

ANNOUNCEMENT

Output Increased. Opportunity for More Dealers

After more than a year of successful manufacturing and selling, during which time our entire output has been taken by our 60 dealers, we have arranged our factory facilities and finances to immediately double our output. Accordingly, we are now able to offer the money-making opportunity of handling Stewart delivery trucks to other dealers in open territory all over the country.

The Poor Dealer's Hindsight Is the Wise Dealer's Foresight

ARE YOU the leading dealer in your city? If not, why not?

HAVE YOU EVER wished that today you were handling one of the big-selling pleasure cars? Have you ever regretted that a few years ago when you had the chance to take on one of these cars you did not look far enough ahead to hook up with a winner?

IF SUCH HAS BEEN your experience, we want to tell you that today opportunity is again knocking. Today you have a chance to line up with a selling proposition better, we believe, than even the best touring car agency you could have secured 4 or 5 years ago.

THE STEWART DELIVERY TRUCK offers you a selling proposition that is not all PROMISE.

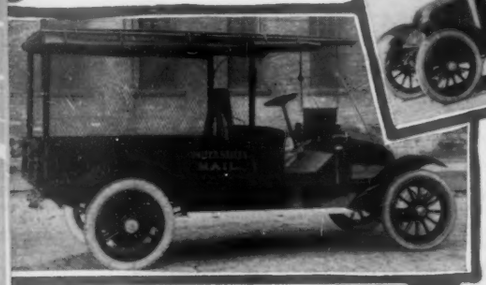
ALREADY IT IS MAKING GOOD for 60 live dealers in 60 cities and towns throughout the United States, Canada and South America.

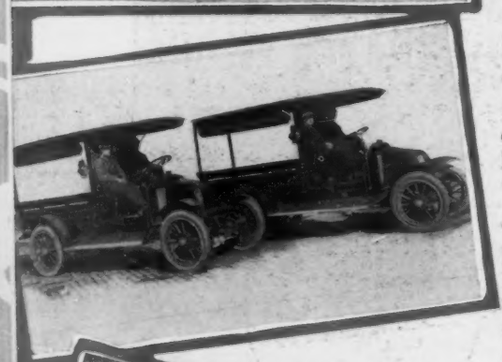
ALREADY CUSTOMERS in 42 different lines of trade have been using Stewart delivery trucks for months—AND WE DO NOT KNOW OF A SINGLE DISSATISFIED USER.

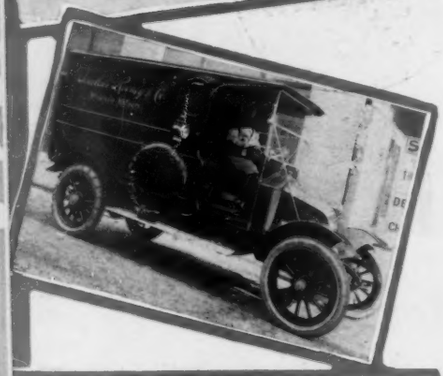
READ, on the following three pages, the description of the Stewart delivery truck. Every word of it is worth dollars to you.

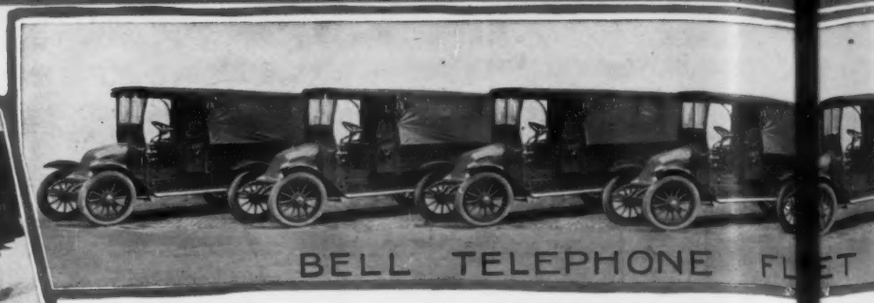
Don't fail to read it all.

Stewart
Delivery Trucks









Here Is the Delivery Car Mer ch

STEWART DELIVERY TRUCKS. 1500 pounds capacity, meet the big demand already existing for a light weight, high grade, moderate priced delivery car suitable for use in retail businesses and for all kinds of light, fast delivery work. Merchants are tired of trying cheap delivery cars. They have learned their lesson. They have found that only a delivery car designed for the purpose and built by men of experience will answer the hard requirements of delivery work.

THE STEWART is acknowledged by merchants, dealers, automobile experts and engineers as being the long-looked-for solution of the merchant's delivery problem. Every engineer who has examined the Stewart has praised it highly. Not one has been able to point out a flaw or a feature that should be changed.

THE HIGHEST GRADE MECHANICAL UNITS known to the industry have been incorporated in the Stewart. Such units as Continental motor, Bosch magneto, Brown & Lipe transmission, Timken axles, Timken roller bearings, Fedders radiator, Gemmer steering gear, Firestone demountable rims. Nothing better than these features of construction is obtainable. The use of these proven parts throughout guarantees that the come-backs on the dealer will be practically nil.

The Men Behind

Stewart delivery trucks are designed and built by men with years of experience in the motor car industry and other manufacturing lines. They have always been associated with successful companies and successful cars. In the Stewart they are giving the dealers and the public the maximum result of their experience.

T. R. LIPPARD, president and manager, formerly vice-president and manager of the Lippard-Stewart Motor Car Company; previously, general manager of the Franklin Automobile Company; prior to that, associated with the National Cash Register Company and other important industries.

R. G. STEWART, vice-president and chief engineer, an engineer of widely recognized ability. He was designer of the Lippard-Stewart car. Prior to this he was connected for years with such concerns as the Olds Motor Works, the Franklin Automoblie Company and others.

R. P. LENTZ, secretary and treasurer, has had wide experience in accounting and financial work.

Dealers will find these men, and other members of our organization, good men to do business with—men who know what the dealer wants and how to give it to him.

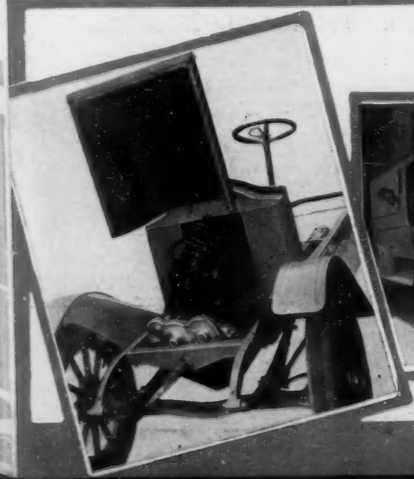
Easy to Operate and Care For

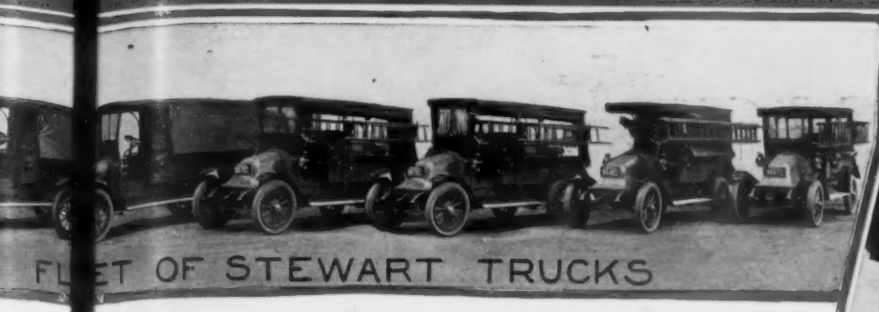
STEWART TRUCKS are built to last. They are designed so as to require the minimum of attention. We have made it easy for the driver to give them what little attention they do require. They are so simple that horse drivers quickly learn to operate and care for them. Every adjustment, every grease cup has been placed where it can be easily and quickly reached.

ALL OF THE UNITS that go to make up the car are so placed and so supported that, if necessary, each one can be taken out in one-third the time ordinarily required in other motor cars—and without disturbing other units or the load. The saving of time in yearly overhauling thus made possible will prove a big item in cutting down maintenance cost.

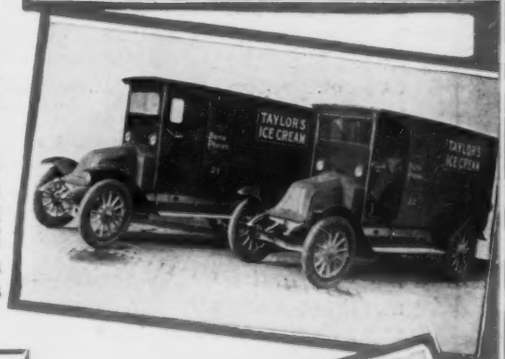
How Stewart Delivery Trucks are Built

THEY ARE DESIGNED and built by men of wide experience in the automobile business and other manufacturing lines. We are not





Stewart
Delivery Trucks



chants Have Been Waiting For

a new concern. Our organization has been manufacturing light delivery trucks for three years. We know this business. We have been all through the experimental stages, and in offering you the Stewart, we are offering something that is thoroughly tried and proven.

THE STEWART MOTOR CORPORATION is amply financed. We have never failed to discount a bill. We pay cash for our materials. We buy in quantities, thus securing the benefit of the parts-makers' best prices. We manufacture on a scale large enough to permit us to employ the most up-to-date manufacturing methods. We are concentrating all our efforts and all our facilities on 1500-pound delivery cars only. We are specialists.

OUR CARS ARE BUILT in a large, well-equipped factory having facilities for an output of 3,000 cars per year. Up to now we have not worked for a large output. We wanted to put our cars into use in many cities in all parts of the country, to prove them under the most diverse conditions of actual use. Now we have done this; our cars are in successful operation in more than 60 cities. And now we have arranged our facilities and finances to double our output immediately.

Greatest Opportunity in Commercial Field

ARE YOU ONE of those dealers who have said: "Yes, the commercial car business is the coming business, but I'll wait a little till the commercial car is really perfected"?

IF YOU ARE STILL QUOTING this worn-out maxim, it's about time to forget it. The commercial car is here—NOW. The commercial car is perfected. And while you're waiting for it, your competitors are likely to be laying the foundation—and building the first story, too—of a big success.

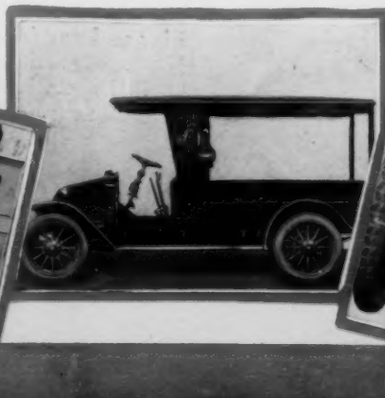
THE FIELD of the light delivery truck is practically unlimited. Already our cars are in use in more than 42 different lines of trade—and our dealers have only scratched the surface.

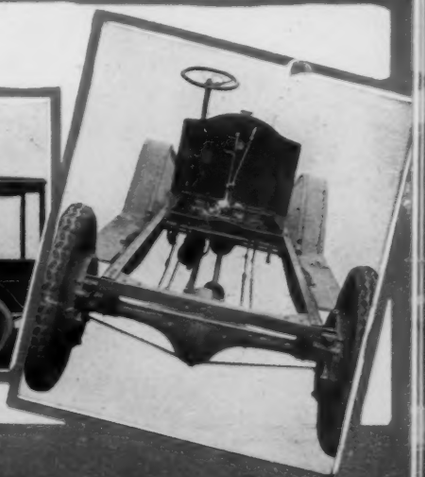
A Year-'Round Business

YOU CAN SELL Stewart Delivery Trucks every month in the year. No seasons. Little or no trading. In fact, you are free from all the drawbacks of selling touring cars.

Specifications

Motor—4 cylinder, Continental, 30 h.p., 3¾" bore x 5¼" stroke. Valves enclosed.
Lubrication—Force-feed, constant level system.
Ignition—Bosch high tension magneto, fixed spark. No batteries, coils or commutator.
Carburetor—Mayer, with dash adjustment so simple that any boy can properly regulate carburetor.
Cooling—Centrifugal pump. Large radiator at dash, supported on coil springs.
Transmission—Brown & Lipe selective sliding gear type. Transmission and clutch case integral.
Clutch—Multiple disc, dry plate type, with 285 sq. in. clutch contact surface—twice that of the average clutch. No adjustment, no lubrication needed.
Rear Axle—Timken full-floating type; 5 to 1 gear, Timken roller bearings.
Front Axle—Timken I-beam section.
Control—Left-hand drive with center control; Gemmer steering gear.
Springs—Front, semi-elliptic, 38"x2". Rear, semi-elliptic, 50" x 2¼" with Sager auxiliary coil springs.
Frame—High carbon steel, heat-treated, with unusually high factor of safety.
Wheels and Tires—35"x4½". Firestone demountable rims. Wheel base 126".
Price—$1650, chassis.
Stock Bodies—Panel, $150; express with top, $125; wire screen express with top, $150; open express, cape top, $150; stake platform, cape top, $160; undertaker's, $600.





Stewart
Delivery Trucks

DON'T CONFUSE the light delivery car business with the heavy truck business. Light delivery cars are far easier to sell. They do not involve anywhere near so great an investment either on the part of the merchant or the dealer. The come-backs on the dealer for service and repairs are really less than in the touring car business.

WHERE THERE IS A MARKET for one heavy truck you will find a demand for 4 or 5 Stewart light delivery cars. Furthermore, this field is not being worked very hard—yet. The main competition in the commercial car business is among the heavy trucks—not the delivery cars. The Stewart delivery truck really has only one or two competitors, where you will find scores in the heavy truck field.

Demand Increasing Rapidly

EVERY STEWART TRUCK sold in your town is a salesman on wheels for other Stewart trucks. Just as soon as one department store, or grocer, or florist, or laundry, or hardware dealer, or confectioner, or other merchant adopts motor delivery, all the others in the same line must do likewise to keep abreast of the times.

IN SELLING Stewart delivery trucks you have every possible argument to back you up. Convenience, up-to-dateness, keeping customers satisfied, keeping abreast of the times, economy. In many instances Stewart delivery trucks are actually paying for themselves the first year through savings they make over horse delivery. They are money savers, time savers, trade bringers.

Decide Today While Your Competitor Is Making Up His Mind

YOU'LL HAVE TO HURRY if you want to secure the agency for this money-making commercial car. Don't delay in getting in touch with us. Your competitor is probably watching for just such an opportunity as this. Beat him to it. Don't wait to write, wire.

COME TO THE FACTORY and look us over. Meet our organization. Look over our facilities and judge for yourself our capacity for making prompt deliveries. A visit to the factory will tell you more than a hundred letters.

A Few Stewart Users

Note the wide range of businesses and locations.

NAME	PLACE	BUSINESS
D. S. Hendrick Co., Inc.	Washington, D. C.	Mail Service
New York Telephone Co.	New York & Buffalo	Telephone
Taylor Ice Cream Co.	Buffalo, N. Y.	Ice Cream
South Park Commission	Chicago, Ill.	Park Commission
Diamond Laundry	Los Angeles, Cal.	Laundry
Hudner Markets, Inc.	Fall River, Mass.	Provisions
Emerson Bros.	Brattleboro, Vt.	Furniture
Wardell Steam Laundry	Newark, N. J.	Laundry
Genesee Pure Food Co.	Le Roy, N. Y.	"Jell-O" Dessert
J. B. Wiese	Buffalo, N. Y.	Florist
Matthews-Laing Co.	Ottawa, Ont.	Meat Dealers
Rapid Transit Co.	Edmonton, Alberta	Street Railway
Acme Co.	Edmonton, Alberta	Department Store
F. S. Fiske	Baltimore, Md.	Caterer & Confect'r
Mfrs.' & Traders' Bank	Buffalo, N. Y.	Bank
Gomery Bros.	Allentown, Pa.	Commission Mer.
Milden & White, Inc.	Philadelphia, Pa.	Fish Dealers
H. C. Ness	Montreal, Canada	Pork Dealer
Wm. S. Weber	Pottsville, Pa.	Undertaker
Keers Baking Co.	Philadelphia, Pa.	Bakery
Crane Ice Cream Co.	Philadelphia, Pa.	Ice Cream
Buffalo Fire Department	Buffalo, N. Y.	Fire Department
T. C. Borg	St. Paul, Minn.	Furniture Dealer
Atlantic City Tel. Co.	Atlantic City, N. J.	Telephone
L. W. Killeen	Schenectady, N. Y.	Cigars
Stern Bros.	New York, N. Y.	Department Store
Magnus Beck Brewing Co.	Buffalo, N. Y.	Brewery
Sibley-Lindsay & Curr.	Rochester, N. Y.	Department Store
C. T. Brigham & Co.	Pittsfield, Mass.	Paper & Woodenware
Caesar's Express	Pittsfield, Mass.	Baggage
Mongeau & Frere	Montreal, Canada	Groceries & Meats
Kearns & Carroll Co.	Newark, N. J.	Silk Dyers
W. H. Hannold & Sons	Swedesboro, N. J.	Undertakers
Joseph Wotiz & Sons	Newark, N. J.	Meat Dealers
Buffalo Courier	Buffalo, N. Y.	Newspaper
Coopers Ice-Cream Co.	Pittsfield, Mass.	Ice Cream
S. Rosenstein	Newark, N. J.	Liquor Dealer
Sinclair-Rooney & Co.	Buffalo, N. Y.	Wholesale Millinery
I. Magnin & Co.	San Francisco, Cal.	Department Store
J. Moschel	Buffalo, N. Y.	Meat Packer
Haas Tobacco Co.	Buffalo, N. Y.	Tobacco
Montreal News Co., Ltd.	Montreal, Canada	Newspaper Publisher
H. C. Ricketson	Plattsburg, N. Y.	Baker
Coffin Bros.	Schenectady, N. Y.	House Furnishings
Fred Rosa	Fishkill-on-the-Hudson, N. Y.	Furniture
J. S. Schrauth's Sons	Poughkeepsie, N. Y.	Furniture
Paul Mertching	Sharon Spring, N. Y.	Farming & Hops
Max Kaplan	Gloversville, N. Y.	Wholesale Fruit
Brown & Hastings	Los Angeles, Cal.	Stage & Mail Route
Wise Furnace Co.	Akron, Ohio	Furnaces
J. F. Berner Hardw. Co.	Buffalo, N. Y.	Hardware
Haskell Imp. & Seed Co.	Lewiston, Me.	Farm Implements

ACT NOW. **And remember, the poor dealer's hind-sight is the wise dealer's fore-sight.** Send in the coupon today.

STEWART MOTOR CORPORATION, Buffalo, N. Y.
I would like to have your catalog and dealership proposition for the following territory:

.....

.....

Name .....

City .....

State .....

Get This Straight

Please bear in mind that the Stewart Motor Corporation of Buffalo, N. Y., organized and directed by T. R. Lippard, R. G. Stewart and R. P. Lentz, is separate and distinct from any other truck company using our name or the names of our officers.

Stewart Motor Corporation
BUFFALO, N. Y.

T. R. Lippard, Pres. and Mgr. *R. G. Stewart, V. P. and Ch. Eng.*
R. P. Lentz, Sec. and Treas.

Clear the Way for Better Business

Increase and improve your business this year by pushing the A-B line of electrical equipment for automobiles. The quality of these products and the hearty co-operation of the dealers are making this the most successful line of the season

AB AUTOLITES

AB TRUMPET

Head, Side, Dash, Tail and Trouble Lights

High-grade, handsome lamps, made by improved machinery in such quantities that they can be sold at a price which is bound to bring the business.

Point out to any car owner the graceful lines of this lamp. Show him how the cases are made of drawn steel, the reflectors of prepared brass heavily silver plated. Tell him they are backed by the guarantee of a firm with 20 years of manufacturing experience.

Write for Our Catalogue and Proposition to Dealers

The Stop - Look - Listen Horn

A simple, well constructed horn, that works all the time because there are no delicate parts to wear out or to adjust.

Let your customers see how simple the mechanism is, and how well it is built to stand the jar and shock of the roads.

The contacts are sterling silver—and will not rust.

The springs are phosphor bronze and will not weaken. The diaphragm is heat-treated steel and will not buckle or break. Give them your guarantee that the horn will be satisfactory; we will back you.

The Adams-Bagnall Electric Co., Cleveland, Ohio

NEW YORK PITTSBURGH SYRACUSE BALTIMORE ATLANTA
ST. LOUIS CHICAGO BOSTON PHILADELPHIA

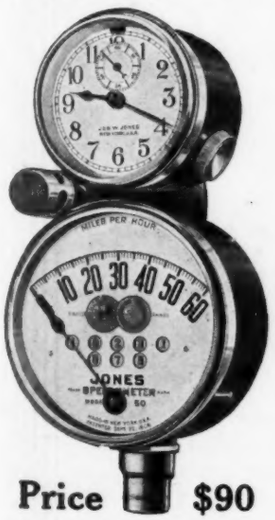
R. E. T. PRINGLE, Canadian Representative: Toronto, Montreal, Winnipeg, Vancouver.

Double-Page Advertisements to Consumers

Every New Jones Is a Master Instrument

Price $50

MODEL 50—4-inch dial, 60-mile speed scale, with large, equally-spaced figures. A large figure Season and Trip Odometer, registering to 100,000 miles for season and 100 miles for trip. Tenths of miles shown by red right-hand figures. Instantaneous trip reset. Standard finish black enamel with nickel trim bezel ring, brass ring optional.



Price $90

MODEL 350—Same as Model 50, with 3-inch Boston 8-day stem-wind and stem-set clock, and electric light.

Tested 16 times after completion to make sure of accuracy. Built slowly to obtain the utmost in precision to make certain, permanent success. Here is utter simplicity. Direct indication from the wheel of the car to the indicator. No lapses. No bridging. No compensators. Not the slightest effect from any outside influence.

The New Jones is temperature-proof. It is steady and accurate, summer and winter. Motorists now are using their cars the year 'round. They want a speedometer that isn't affected. Every New Jones is a master instrument, accurate and permanent. No matter how large the output each instrument must meet a certain, rigid, standard.

We Are Telling 15,000,000 People

We are using Ten-Thousand-Dollar Ads to tell 15,000,000 people the facts. These ads, in the Saturday Evening Post, Collier's Weekly, and other great magazines, are wielding a powerful influence.

300,000 Cars Equipped

300,000 cars carry the Jones equipment. Thousands of owners will put it on old cars because they want year-'round accuracy.

The New Jones, operating without any cam or complicated arrangement, is good for a lifetime of accurate service. It reflects nothing but credit on the car manufacturer who equips his output with it.

Backed by Perfect Facilities

Nothing in the New Jones Speedometer will ever be sacrificed to output. Jones instruments in the largest lots are as perfectly built as the highest-grade watch. Each instrument gets every test and inspection, every care and attention, that insures the standard Jones-result — absolute accuracy. And our system is such that these accurate instruments come through without the slightest delay.

Jones prices are fixed at the factory and no Jones is ever sold for less.

Get Equipment Figures

Write for Jones prices to car manufacturers. See what a quality-instrument like the New Jones will cost on your output. Get the Jones books that go into detail in regard to Jones construction.

The Jones is sold under a general guarantee of satisfaction. Service Stations in all of the principal cities of the world.

Price $60

MODEL 60—4-inch dial, 70-mile speed scale, with large, equally-spaced figures. Low initial speed indication. Large Odometer figures, registering to 100,000 miles and repeat for the trip. Tenths of miles shown by red right-hand figures. Instantaneous trip reset. Standard finish—black enamel with nickel trim, brass optional. Leather covered casing.

Price $110

MODEL 160. Same as Model 60, with 3-inch Chelsea 8-day stem-wind and stem-set clock, and electric light.

The Jones Speedometer, Broadway at 76th Street, New York City

BRANCHES

New York, Broadway at 76th St.
Boston, 109 Massachusetts Ave.
Philadelphia, 1427 Vine St.
Chicago, 1430 Michigan Ave.
Baltimore, 217 W. Saratoga St.
Detroit, 872 Woodward Ave.
Buffalo, 20 Goodrich St.
Pittsburgh, 5904 Penn Ave.
Cleveland, 1845 Euclid Ave.
Charlotte, 209 Church St.
Memphis, Madison Ave. and 4th St.
Minneapolis, 800 Hennepin Ave.
Omaha, 1608 Harney St.
San Francisco, 1436 Van Ness Ave.
Los Angeles, 408 W. Pico St.
Portland, Ore., 71 Seventh St.
Seattle, 1710 Broadway
Indianapolis, 1201 State Life Bldg.
Atlanta, 35 N. Pryor St.
New Orleans, Barronne & Perdido Sts.
Birmingham, 18 S. 20th St.
Denver, 1600 Broadway

FOREIGN AGENCIES

J. Millen & Son, Ltd., Montreal, Toronto, Winnipeg, Vancouver.
Markt & Co. (London), Ltd., London.
Markt & Co., Hamburg, Milan, Vienna, Barcelona.
A. A. Kampfraath (Brussels), Ltd., Brussels, Amsterdam.
Severin & Co., St. Petersburg.
G. Bruggemann, Moscow. Y. D. Rose, Paris. (16)
William D. Easy & Co., Sydney, Australia.
The Tarrant Motor Co., Melbourne, Australia.
C. E. Helvie, Manila, P. I.
Adams, Ltd., Christchurch, New Zealand.
Markt & Schaefer Co., Rio de Janeiro, Brazil; Buenos Aires, Argentine; Mexico City, Mex.; Habana, Cuba; San Juan, P. R.

THE NEW JONES SPEEDOMETER

When Writing to Advertisers, Please Mention Motor Age.

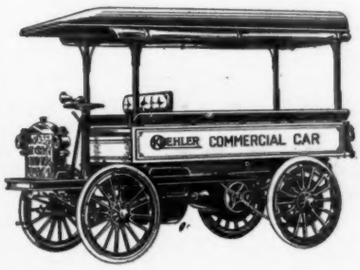
KOEHLER COMMERCIAL CAR

CARRYING CAPACITY 1600 LBS. $ PRICE 750.

The Dealer Who Sells A Koehler Secures A Satisfied Customer

The sturdiness of the KOEHLER—its low cost of up-keep—the wonderful service it gives—all combine to make a KOEHLER owner a KOEHLER enthusiast. He recommends it to friends.

The Light Delivery Wagon Field is rapidly widening. And foremost in the field is the KOEHLER. It is designed by the best-known commercial car designer in the world. Built of the highest quality materials obtainable, it combines a dozen advantages not found in any other car.



ONE OF ITS MANY SPECIAL FEATURES IS THE **ENGINE LUBRICATION** — The crank case acts as the oil reservoir. This insures absolute cylinder lubrication. A positive gear pump forces the oil to the outside working parts of the engine, whence it returns to the crank case to be used over again. One filling is sufficient for at least 300 miles—**real economy.**

Large and roomy. Inside measurements, 44 inches wide, 84 inches back of driver's seat to rear. Flare-boards, 17 inches above floor. **CAPACITY,** 1600 lbs. **PRICE,** $750. Strongly ironed throughout, also ironed to receive four post canvas top, which can be had from stock at $40 additional.

LOOK AT THE SPECIFICATIONS

MOTOR—2 cylinder opposed, 22-24 H. P. Lubrication mechanical and integral with motor; 300 miles one supply of oil; Model L Schebler carburetor.

COOLING—Thermo-syphon system.

IGNITION—Bosch High-Tension Magneto. No batteries or coil needed.

CONTROL—Left-hand, throttle lever, on steering column.

DRIVE—Direct line double universal joint with jack shaft. Final drive from jack shaft to rear wheel sprocket through double side chains.

TRANSMISSION—Planetary type. All gears genuine chrome nickel steel, hardened throughout.

BRAKES—Service brakes on jack shaft. Emergency brakes simple in design, extraordinarily powerful, operated independently.

TIRES—2½ in. Solid Rubber motor tires.

TREAD—58 in.

CAPACITY—1,600 lbs.

WHEEL BASE—90 in. Wheels—36 in. front and rear, artillery type, fitted with demountable rims.

SPEED—4 to 16 miles per hour.

PRICE—$750 to $900, depending on body equipment.

OIL TIGHT CASE—In which transmission, differential, bevel gears and metal to metal clutch runs in a CONSTANT OIL BATH. 1,000 miles with one supply of oil.

Address all correspondence to

H. J. KOEHLER S. G. CO., 1709 Broadway, New York, N. Y.

Your Service from a Rugged One-Ton

SELDEN TRUCK

Begins Upon The Payment of Only $500

It will surely earn its cost during the time you have to pay for it, and more. Simply pay in $500 on delivery and the balance in twelve monthly payments. In the

SELDEN TRUCK AT $2000

you will possess a big, powerful, sturdy truck, built by a factory whose guarantee for years has been unquestioned.

The hearty welcome of our

TIME PAYMENT PLAN

by business men who, owing to the heavy initial expense, have never before felt able to install a dependable time and money-saving delivery service, only verifies our unlimited confidence in the endurance and efficiency of our product.

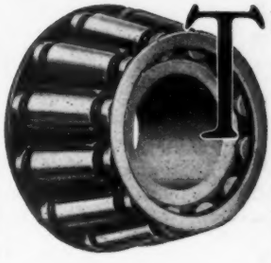
Stronger and better built than any other truck of like capacity, it's easy to acquire, easy to operate and easy to pay for.

We have some unassigned territory open for agents with first-class sales and service facilities

SELDEN TRUCK SALES COMPANY

257 East Avenue **ROCHESTER, N. Y.**

The Accounting Department Must Justify Motor-Haulage



THE record will go down, black on white, in your books—day by day, week by week, year by year.

Will the balance be on the right side?

That depends on three things: No. 1—Does your business fit the truck? No. 2—Does the type of truck fit your business? No. 3—Will the truck stand up to the job after you get it? *Don't neglect No. 3.*

The first two have been studied and investigated, from every angle, put down in exact figures, settled definitely. *What's the answer to No. 3?*

Look to the parts that carry the load

When the giant truck rumbles past you over the cobblestones, don't look merely at the body, *look beneath.* That's where the load comes—on the axles and their bearings.

Take a five-ton truck, for example, it weighs about 8,000 pounds, its load, 10,000 more. *Nine tons supported by the four axle* spindles!

Only long years of experience and the devotion of an entire great organization to axle-building can safely determine the size and design of those spindles, the selection and heat treatment of the steel.

It is because Timken-Detroit Axles are made by such an organization that they are standing up under so many thousands of motor trucks today, both electric and gasoline driven.

750 lbs. on a ⅝-inch roller

The nine tons rest also on the ⅝-inch rollers in the eight Timken Bearings on the four axle spindles.

And not on all of the rollers at that, because only one-fifth of the 120 rollers in the eight bearings, or 24 rollers, are actually under the load at any one time.

Think of it, nine tons on 24 rollers. 750 lbs. on each!

But Timken Tapered Roller Bearings carry this load—what's more they take the tremendous side-pressure when corners are turned, the pound and jolt of the rough roads, the extra stresses due to careless driving.

All the conditions have been foreseen by Timken Engineers—and they have established a factor of safety far enough above the 750 lbs. to *make sure of emergencies.*

Building truck axles and bearings that stand up to the work

Timken Engineers have built on the experience of all motor-truck designers and builders, domestic and foreign.

They have minutely tabulated records of their own experience, going back before the first practical conception of motor-haulage.

Timken Engineers have at their service two great organizations whose only occupations and ideals are to build the best possible axles and bearings for pleasure and commercial cars.

They can help you answer that third question with a "Yes."

You will find the whole story of axle and bearing importance—for pleasure cars as well as motor trucks—in the Timken Primers No. T-1 "On the Care and Character of Bearings," No. T-2 "On the Anatomy of Automobile Axles." Sent free, post-paid, from either address below.

The Timken-Detroit Axle Co.
Detroit, Mich.

The Timken Roller Bearing Co.
Canton, Ohio.

TIMKEN
BEARINGS & AXLES

When Writing to Advertisers, Please Mention Motor Age.

STANWELD Rims positively prevent tire-wobbling. For that reason alone you should specify them on your cars.

Tire-wobbling causes wear at spots not intended as traction surfaces. Such uneven wear considerably shortens the life of any tire.

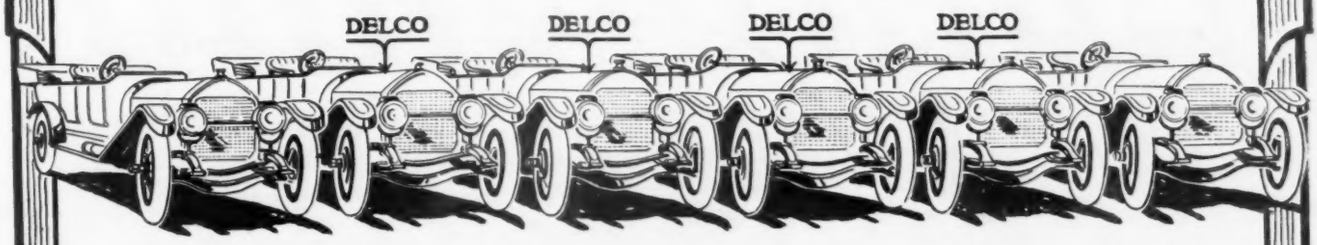
In some instances, wobbling is caused by mis-alignment of the wheels due to accident, or the rims have been incorrectly applied. On cars equipped with demountable rims, wobbling is more often caused by the unscientific construction of the rim.

Stanweld Rims are the only demountable rims that require no lateral movement of the rim-base to tighten. The Stanweld felloe-band has a flange that acts as a gauge for the perfect position of the rim-base on the wheel. Tightening and loosening of the clamping devices do not alter that position.

One manufacturer will use nearly 50,000 sets during the coming season.

The Standard Welding Company—Cleveland

STANWELD RIMS



Two-thirds of all Electrically Cranked Cars in Use Today are Delco Equipped

Count them for yourself as you see them on the street.
You'll be surprised to find the remarkable preponderance of Delco equipment.
Now go a step further if you will.
Visit the repair shops—you'll find that the Delco is almost never in the hands of the trouble man.
All of which simply emphasizes pretty forcefully what we have been saying over and over again—"Delco Equipment is Built for Service."
It is right fundamentally—It is right electrically—It is right mechanically.
No automobile engine is too big for it to crank easily and effectively.
No service to which an automobile can be put is too severe for it. It is almost impossible to damage it by jolting or vibration.

The Delco System

Electric Cranking Lighting-Ignition

Delco equipment is the only electrical cranking equipment that has been in actual use in the hands of automobile owners long enough to thoroughly demonstrate its efficiency.

Not quite two years ago, the first electrically cranked car appeared on the market—it was equipped with the Delco System.

During the automobile season of 1912 twenty thousand of these cars were sold and by January 1st of this year about 20,000 were in use.

We hoped to be able to produce 40,000 equipments during the calendar year of 1913.—That was the outside limit of our expectations of January 1st.

But the record of the Delco System on those 20,000 cars already in use was entirely too convincing a demonstration of Delco efficiency.

The demand of this year was so insistent that we have had to more than double our anticipated production.

During the first four months of 1913, in spite of the interruption of the great flood, 15,000 Delco equipments were produced, and by the end of the year a full 100,000 Delco equipped cars will be in use.

Can you imagine a more amazing and positive endorsement of Delco superiority?

And now, note this point—this tremendous Delco business has been built solely on the performance of Delco equipment.

It hasn't been what we have CLAIMED for it—we didn't make any claims until after thousands of cars had been in actual use for a year, demonstrating Delco efficiency.

It hasn't been the work of an aggressive sales force—we haven't any sales force.

Delco success is based solely on what Delco equipment has DONE in actual service. You can't go back of that.

The Delco Equipment on more than 40,000 cars at this minute is giving positive, unfailing service to more than 40,000 satisfied users.

Do you wonder that we grow somewhat enthusiastic when we try to make you understand that the Delco System is more than simply a motor and a battery and a bunch of wires?

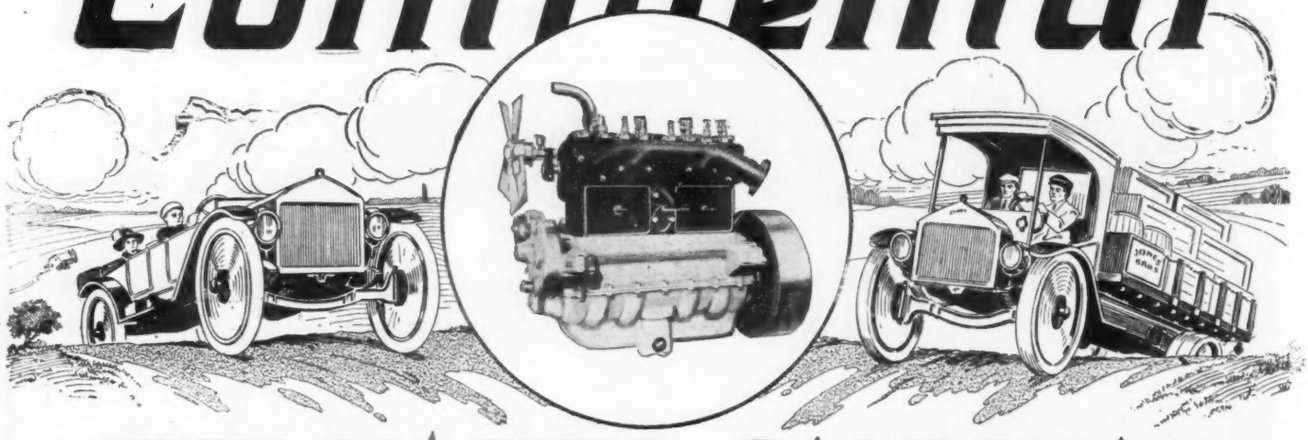
It is the experience, the skill, the know-how back of it that gives it its dominance in the Electric Cranking and Lighting field.

It is the quality that is built into it that is placing Delco Equipped cars at a premium, and that is causing the insistent demand that has almost swamped this great six-story factory of ours.

If you are interested in the development of Electric Lighting and Cranking, write for the Delco Book

The Dayton Engineering Laboratories Company, - Dayton, Ohio

Continental



THE MASTER SALESMAN

The name Continental carries with it a mighty influence for sales. Every car or truck powered with this famous motor comes from its factory a preferred motor vehicle.

Seventy-five thousand Continental motors in daily service have made it so.

They have made good by their **work,** by actual performance in doing their share of the world's work for ten years of faithful service.

In the minds of car buyers, dealers and manufacturers the name Continental gives implicit confidence. It signifies the world's leading standard motor. It explains why the Continental is found in over fifty different makes.

The Sale Half Made

The salesman whose goods are favorably known before he approaches his customer, finds his work more than half done.

So it is with the car Continental equipped.

The buyer knows the Continental. He knows its overwhelming dominance in the motor trade.

He knows that it is the product of an organization larger and more highly specialized in the building of motors than any other in the world.

He knows that fifty concerns—some of them the leaders in the automobile industry—bank their business future on the integrity of the Continental.

And motor history will tell him that Continental motors have built up more automobile reputations of merit than any other single factor in the business.

Where The Saving Comes

The manufacturer who uses Continental power saves in several ways.

He can buy the Continental for less than he could build motors himself — because we specialize in that one thing alone and produce in enormous quantities.

He gets a better motor than he can design and build—because ten years and the experience of a hundred engineers with whom we are in constant touch have designed the standard Continental.

His salesmen and dealers are not required to sell an unknown motor. The name "Continental" stops all argument. It is accepted by the prestige it carries. It saves the salesman's time.

Over fifty manufacturers realize this and are cashing in. Many more will do so as the industry matures—to their own and their customers' profit.

The Story of the Season

From one motor a week to 600 is the production record of ten years' growth in Continental demand.

Yet each season tells the same story—"sold out."

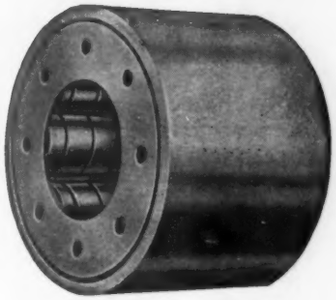
With seventy-five thousand Continental motors on the road developing 3,000,000 H. P. in the world's work and making this motor more famous every day, the wise manufacturer of motor vehicles will act now. He will tap this flood of Continental power to propel his vehicles before the "sold out" sign appears. And he will "cash in."

Continental Motor Manufacturing Company

Detroit, Michigan

Factories at Detroit and Muskegon, Mich.

HYATT QUIET BEARINGS



LONG SERIES

The Short Series, High Duty Type, of the Hyatt Roller Bearing is furnished in shaft diameters from one to three inches inclusive, and in length from one inch upward. The Long Series is furnished in the same diameters and in lengths from two to three and one-half inches.

Special diameters and lengths to meet individual requirements, consistent with proper engineering practice, will be furnished promptly.

Short Lengths are made possible in the High Duty Type through the use of nickel steel rollers, properly heat treated and ground, operating on solid inner and outer steel casings, also heat treated and ground. Heavy loads can thus be concentrated on short lengths.

HYATT ROLLER BEARING CO.
DETROIT, MICHIGAN
WORKS, NEWARK NEW JERSEY

STUTZ

The Stutz Car Has the Endurance

When a man pays his good money for a motor car, in addition to the graceful lines, the beautiful finish, luxurious, comfortable equipment—he has a right to expect *endurance*. Unless a car has the *endurance* it will never earn its purchase price, because *endurance* means service—means *cost per mile*.

Ask any man that *knows* motor cars—ask any man that drives a Stutz—and he will unhesitatingly tell you that the Stutz is famed for its *endurance*.

Endurance Is Built Into the Stutz

The Stutz never fails on any road or hill. It will plow through the deep mud and the sand, because *endurance* is built into it. The Stutz has a record unequalled for consistent performance and *endurance*.

No Stutz has ever been taxed to its utmost, because the makers build into the Stutz a *reserve endurance* that laughs at the most severe road conditions ever encountered.

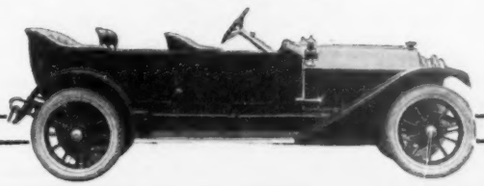
Endurance Means Bigger Car Value

The workmanship and finish are all anyone could desire—it is exceedingly easy riding and comfortable. The straight line, low slung body, deep upholstery and luxurious appointments, give the Stutz an aristocratic design, dignity and quality not exceeded in any of the higher priced cars.

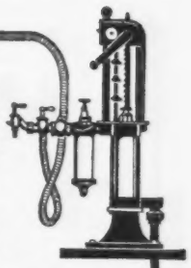
If you are in the market for a car—if you are a dealer looking for a car to handle exclusively, or to strengthen your present line—before you close, *investigate the Stutz*, the car that has made a record for *endurance*.

Write today for descriptive literature, etc. Ask for Catalog A-2.

STUTZ MOTOR CAR COMPANY
Indianapolis, Ind.



WHY A BOWSER SAVES



Gasolene is too high priced to waste and it's bound to be wasted in the ordinary "air-tight" tin faucet above ground containers.

If you want to keep gasolene in the same high grade condition that you buy it, install it in a Bowser Underground tank where the temperature hardly varies the whole year round.

A Bowser System is Easy to Operate

There is no spillage, no waste, no lugging of pails full of gasolene from the tank outside the garage in rainy or sleety weather, no evaporation, no loss of any kind. It's the simplest, quickest, cleanest, most economical method you ever imagined.

You can buy a Bowser Underground Storage Outfit to meet your needs and fit your purse. It will save enough to pay for itself in a year and will outlast a lifetime.

Send for free illustrated booklet

S. F. BOWSER & CO., Inc., Home Plant and General Offices Box 2128, Fort Wayne, Ind., U. S. A.

Sales Offices in all Centers and Representatives Everywhere.

Original Patentees and manufacturers of standard, self-measuring, hand and power driven pumps, large and small tanks, gasolene and oil storage and distributing systems, self-registering pipe line measures, oil filtering and circulating systems, dry cleaner's systems, etc.
Established 1885.

WHEN YOU BUY AN AUTO TRUNK

Look for the Red "K" and Gold "Diamond" on the Front

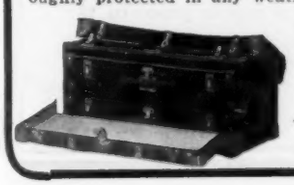
The red and gold trade-mark shows that it's a genuine Kamlee—the handsomest, strongest, most convenient auto trunk ever made.

Light and flexible, yet tough and durable in the extreme, it fulfills every requirement of the touring motorist. New air-tight interlocking edge makes

THE NEW KAMLEE

The Only Really Dust-Proof and Rain-Proof Auto Trunk

on the market. The edges lock together—rain or dust cannot enter anywhere. A rubber tubing at bottom of interlocking groove conforms to any irregularity or give in top and front. Contents thoroughly protected in any weather. Waterproof covering is fastened over top with patent spring-swivel nuts. No straps to bother with in opening. See it at your dealer's or write us for prices and descriptive booklet. We'll gladly send you a Kamlee on approval anywhere if your dealer can't supply you.



THE KAMLEE COMPANY
234 Broadway Milwaukee, Wis.

This Free Book on tires will save you from $50 to $200 a year; 20,000 car owners will verify this. : : : : : : :

This book explains clearly why Durable Treads have been able to make *the phenomenal increase of 900% in sales in one year!*

The remarkable record *of winning converts at the rate of 80 a day*, is a fair indication that Durable Treads *have positively overcome all the objections ever made against Tire Protectors.*

Instead of being unsightly, *they actually look neater on a car than the tire itself!* Instead of heating the tire by creeping on it, they are guaranteed not to creep one inch in 5,000 miles—*and they are the only protectors so guaranteed!* They don't diminish the speed in the slightest, they don't affect the resiliency of the tire one whit—*and they are guaranteed by us, on a refund mileage basis, to run 5,000 miles without puncture!*

Facts like these are sufficient proof that "From Hide to Highway" should be read from cover to cover by every motorist in the country. When you can save from $50 to $200 a year by reading it, *when you can learn from it how to add 5,000 miles more service to the tires on your car right now*, when you realize that it saved over $2,000,000.00 to American motorists last year—you will understand its importance and value to you.

A copy will be sent you FREE at once, without any obligation. Write to the nearest office.

Colorado Tire & Leather Company

450 Golden Gate Avenue San Francisco
462 Fourth Avenue New York
1327 Acoma Street Denver
1111 Karpen Building Chicago

Colorado Tire & Leather Co., Denver
(Address Office nearest to you.)
Gentlemen:—Send me your free book.
Name .....
Street ..... State.....
City..... My Tire Sizes are
Rear.....

MICHENER'S Gasoline Saver and Primer

GUARANTEED TO SAVE 25% GASOLINE

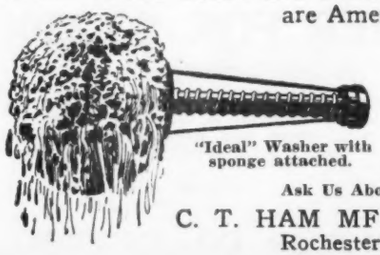
This Gasoline Saver is a simple device controlled by an adjusting rod on the dash or steering post. Regardless of low speed or weather conditions, it admits the "just right" amount of auxiliary air consistent to a mixture of highest efficiency. By breaking up and mixing the gasoline globules with sprays of air, it proves a fuel economizer as well as a power producer. It pays for itself many times over in the gasoline it saves you and in the added service it gives your motor. With this device you can prime your motor when it offers any difficulties in starting by simply pouring some gasoline in the bowl of the Gasoline Saver, and giving the valve a small opening before cranking. This method of priming is infallible. It is the surest engine starter known. Use your motor as a brake when coasting down hill. Close the throttle and open the air valve. It feeds the motor pure cold air, saving gasoline, cooling the cylinders and saving the brakes. These are but a few of the many advantages the Gasoline Saver offers. Let us tell you about its other features just as important. Made for right or left side.

Dash Control, $5.00 Steering Post Control, $6.00

E. S. MICHENER, Washington St. New Castle, Pa.

LIGHT OR WATER

We supply you with the one and save you the other. Ham's Truck and Pleasure Car Lamps are America's very best.



"Ideal" Washer with sponge attached.

Our "Ideal" Carriage Washers and Automatic Water Savers save the water.

Ask Us About Them

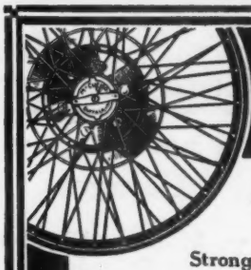
C. T. HAM MFG. COMPANY
Rochester, N. Y.

DUPLEX EXTERNAL BRAKES

ACT INSTANTLY

Whether car goes backward or forward

The Royal Equipment Co.
Bridgeport, Conn.



McCUE WIRE WHEELS

Add a Big Percentage of Tire Mileage

Strong, Resilient, Indestructible

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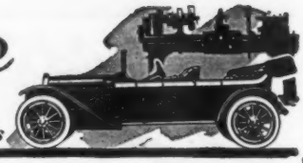

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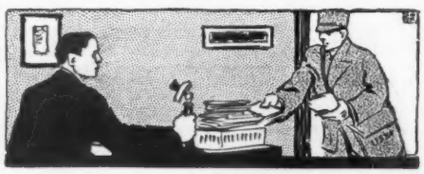

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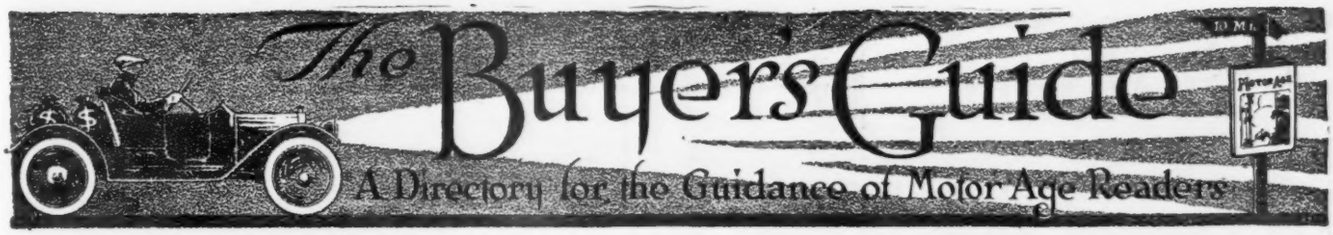

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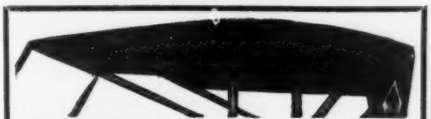
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Index to Advertisements

The Atwater Kent Ignition System

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Today you drive it for pleasure or business and the less you have to think about "stunts" the better you like the car.

There was a time when changing gears was a stunt. Keeping the sight feed oiler at its work, and the coil tremblers tuned up, and the gas generator in condition to generate were other feats of that Stone Age of motoring.

But if you had to go through all those *coups de legerdemain* today you would sell your car and use the trolley.

But there's one bit of juggling that you still practice—and it takes some skill, too! That is the manipulation of the spark lever.

There's a difference between managing the spark and managing the throttle. The latter is voluntary; you open the throttle to go faster and close it to go slower. But the former is forced upon you by the peculiarities of the engine. You advance or retard the spark because you must, not because you like to. And many drivers never really get the knack—they advance or retard at the wrong time, and fuel is wasted and bearings strained in consequence.

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We should like to tell you all about the new Atwater Kent System—Type K—not merely because we want to sell it, though naturally that is a factor, but because we know that automatic spark control is the coming thing, and that the Atwater Kent embodiment of that principle gives the ultimate in reliability, efficiency, and convenience. There's not a motorist who installs it but wonders how he ever endured the annoyance so long. And the marvel of it all is the simplicity and low cost of the device!

In another year or two, automatic control will be universally demanded. You will want to be in the forefront. Write your name and address on the margin of this page and we will send you our Booklet "A" and full particulars of the Atwater Kent System without obligation on your part.

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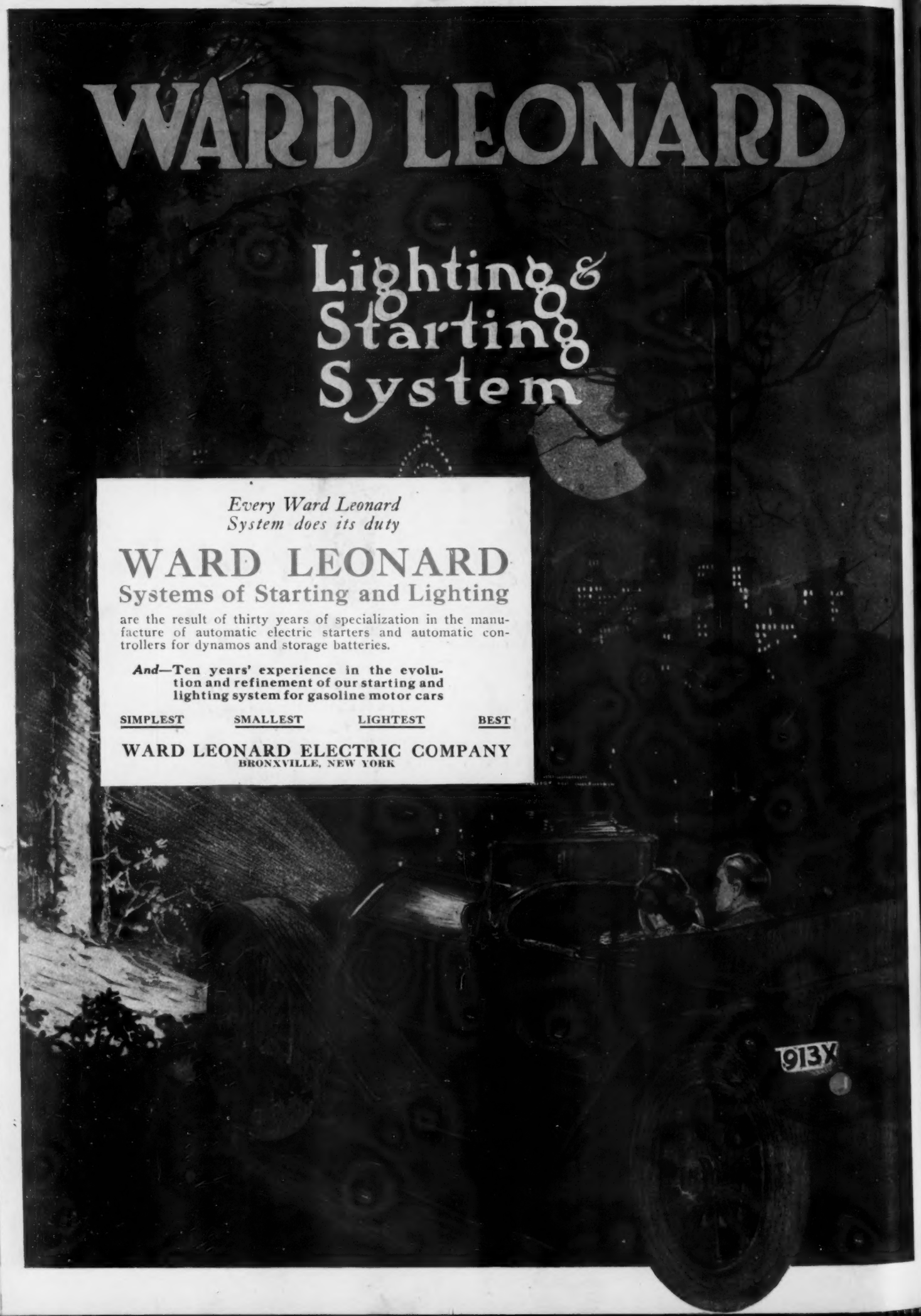
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